BioSCIENCE Original Article
DOI: https://doi.org/10.55684/2025.83.S2.e00015

Endoscopic gastrostomies: what can be their complications and possible correlations?

Gastrostomias endoscópicas: quais podem ser suas complicações e possíveis correlações?

Isabelle Terumi Tanioka Corrêa[1], Roberto Oliveira Basso[2], Leonardo Moreira Dias[2], Carlos Roberto Naufel Junior[1], Guilherme Andrade Coelho[1]

ABSTRACT

Introduction: Percutaneous endoscopic gastrostomy is currently the method of choice for medium- to long-term enteral nutrition for patients with insufficient oral nutrition.

Objective: To individualize its indication, to determine when it is indicated and contraindicated, and to understand and avoid predictable complications.

Method: A retrospective, observational, analytical, case-control study using data from the electronic medical records of those who underwent the procedure from September 2022 to September 2024, with an emphasis on postoperative complications and possible correlated factors.

Result: Seventeen patients were included, who progressed well without complications related to the method, and none developed surgical wound infection until the time of removal, including those who continued with the gastrostomy, regardless of the use of antibiotic prophylaxis.

Conclusion: This study allowed us to outline the epidemiological profile of patients undergoing percutaneous endoscopic gastrostomy in a recognized endoscopy service, contributing data to this topic, a topic that is still very little discussed in clinical studies.

KEYWORDS: Endoscopic gastrostomy. Postoperative complication. Wound infection.

RESUMO

Introdução: A gastrostomia endoscópica percutânea é atualmente o método de escolha para nutrição enteral de média a longa permanência para pacientes com alimentação por via oral insuficiente.

Objetivo: Individualizar sua indicação, para saber quando ser indicada, contraindicada, e entender e evitar complicações previsíveis.

Método: Estudo observacional analítico retrospectivo do tipo caso-controle utilizando dados de prontuário eletrônico dos que realizaram o procedimento de setembro de 2022 a setembro de 2024, com ênfase nas complicações pós-operatórias e possíveis fatores correlacionados a ela.

Resultado: Foram incluídos 17 pacientes que evoluíram bem sem complicações referidas ao método e nenhum evoluiu com infecção de ferida operatória até o momento da retirada, incluindo aqueles que ainda permaneceram com a gastrostomia, independente do uso ou não de antibioticoprofilaxia.

Conclusão: Este estudo permitiu traçar o perfil epidemiológico dos pacientes submetidos à gastrostomia endoscópica percutânea em um serviço reconhecido de endoscopia, colaborando com dados ao tema, tema este que ainda é muito pouco referido em estudos clínicos.

PALAVRAS-CHAVE: Gastrostomia endoscópica. Complicação pós-operatória. Infecção de ferida.

Central Message

Percutaneous endoscopic gastrostomy was developed in the 1980s and revolutionized the mode of enteral feeding for patients who rely on this route for nutrition. Because it is an endoscopic and minimally invasive procedure, it allows comfort and lower risks compared to the prolonged use of nasogastric or nasoenteral tubes.

Perspective

Percutaneous endoscopic gastroscopy should not be used routinely, but its use should be individualized according to strict criteria for each service. This saves inappropriate indication by placing it preferentially for patients with higher morbidity. Its use, in a judicious way, promotes comfort and ease of handling in those with greater clinical complexity, and prevents health systems from being unnecessarily burdened.

[1] Mackenzie Evangelical University Hospital of Paraná, Curitiba, PR, Brazil;
[2] Mackenzie Evangelical College of Paraná, Curitiba, PR, Brazil.

Conflict of interest: None | Funding: None | Received: 10/08/2025 | Accepted: 27/10/2025 | Publication date: 28/11/2025 | Correspondence: belle.terumi@gmail.com | Associate Editor: Jurandir Marcondes Ribas Filho

How to cite:
Corrêa ITT, Basso RP, Dias LM, Naufel Junior CR, Coelho GA. Gastrostomias endoscópicas: quais podem ser suas complicações e possíveis correlações?. BioSCIENCE. 2025;83(S2):e00015

INTRODUCTION

Percutaneous endoscopic gastrostomy was developed by specialists in the 1980s. The main pioneers of this procedure were Drs. James P. Gauderer and Jeffrey L. Ponsky, who developed the technique and contributed significantly to its popularization.[1] It has revolutionized the way enteral feeding is provided to patients who depend on this route for nutrition, since in addition to being an endoscopic and minimally invasive procedure, it allows comfort and lower risks of irritation, ulceration, bleeding, gastroesophageal reflux and pneumonia, compared to the prolonged use of nasogastric or nasoenteral tubes.[2,3]

It is possible for the patient to tolerate approximately 10 days without diet, with hydroelectrolyte replacement alone, before severe protein catabolism occurs, depending on their baseline health status.[2] However, in order to maintain adequate nutrition, even before catabolism occurs, it is considered good medical practice to establish a nutritional route, preferably enteral route, if the oral route is not possible. Enteral nutrition avoids the risk of bacterial translocation, bloodstream infection, and is economically more advantageous compared to parenteral nutrition for those with viable gastrointestinal tracts.[2,3]

Due to the minimally invasive technique used in its performance, the procedure offers greater comfort and quality of life to those who need enteral nutrition for medium to long time, as it replaces nasoenteral and nasogastric tubes, which cause too much discomfort3, in addition to not producing large incisions and scars, as in the case of surgical gastrostomies.[2]

Defining the need for the enteral feeding route in advance and performing the procedure after the indication is well done can prevent weight loss and malnutrition and, consequently, lead to a shorter hospital stay and recovery time.

There are some techniques described for percutaneous endoscopic gastrostomy. The main ones are: pull (the most common), push, and Russell or introduce.[2,4]

In the pull technique, basically the gastrostomy tube is pulled inside the stomach, through the endoscope, into the lumen of the gastrointestinal tract. It is the most commonly used method and was developed by James Gauderer et al.[1] In the push, the gastrostomy tube is pushed into the lumen of the organ through the abdominal wall, without pulling inside the cavity, which is the second most used method. The Russell or introduction technique is defined by the insertion of the gastrostomy tube through a trocar, with a dilator and guidewire.

There is controversy regarding the use of antibiotic prophylaxis 30-60 minutes before the procedure. There are some meta-analyses on the subject in which it is argued that the use of antibiotics, such as penicillins and cephalosporins, reduce systemic infections and surgical wounds, and justify their use due to the vulnerability of patients.[3,5,6] At the same time, there are studies in the literature showing that antibiotic prophylaxis has not obtained positive results in terms of reducing the number of wound infections.[7]

Percutaneous endoscopic gastrostomy can be removed as soon as enteral feeding is no longer necessary or when complications related to the procedure arise, in which only its removal can solve the problem. It is usually removed endoscopically and the wound heals in the first few days, depending on the conditions and comorbidities of the patients.[2]

The indications are basically for those who need enteral access for nutrition, both absolute and complementary, of medium to long duration, or for those who need gastric decompression (less frequent)[2-5,7] some examples being neurological and psychomotor diseases (such as sequelae of cerebrovascular disease, amyotrophic lateral sclerosis, multiple sclerosis, Parkinson's disease, and dementias), reduced level of consciousness (ICU patients in coma), head and neck neoplasms, esophageal neoplasms or lesions, victims of severe facial trauma or polytraumatized, congenital abnormalities such as tracheoesophageal fistula.

The main contraindications of the procedure are divided into absolute (some examples: coagulation disorder, sepsis, bulky ascites, peritoneal carcinomatosis, and obstruction to the passage of the endoscopy) and relative (some examples: hepatosplenomegaly, peritoneal dialysis, portal hypertension, obesity, and pregnancy).[2,4,6]

The main complications related to the procedure are characterized by endoscopic technical difficulties related to the procedure and the patient, late complications associated with difficulty in maintaining and managing the gastrostomy, and in wound care.[2,3,4]

The objective of this study was to promote data on the indication and contraindication of percutaneous endoscopic gastrostomy and to understand/avoid the foreseeable complications.

METHOD

This research was conducted between September 2022 and September 2024 at the Digestive Endoscopy Service of the Mackenzie Evangelical University Hospital, Curitiba, PR, Brazil. It was approved by the Research Ethics Committee of the Evangelical Beneficent Society of Curitiba, under opinion CAAE 84194524.9.0000.0103, in accordance with the precepts of Resolution 466/12 of the National Health Council/Ministry of Health.

This is a retrospective case-control study. Data collection was carried out through an active search in the MVPEP electronic medical record system of 17 cases that underwent the procedure, regardless of the technique used. The selection was made by searching for the ICD-Z931 code and/or the 0309010039 procedure code (percutaneous endoscopic gastrostomy). Patients of all age groups and genders

were included. Only those in which it was possible to obtain complete access to postoperative clinical follow-up, either by hospitalization or outpatient return, were considered. Those whose procedure was incomplete, unsuccessful, or with post-procedure follow-up outside the institution were excluded.

For data collection, a standardized protocol was created with which clinical information was searched for (Tables 1, 2 and 3).

Follow-up time was defined as the interval between the dates of gastrostomy and the last one recorded in the clinical evaluation or death. During the follow-up period analyzed, no deaths were recorded.

Statistical analysis

It was descriptive conducted to understand the distribution of the variables of the data set, using contingency tables for categorical data and measures of central tendency and dispersion for numerical data. The chi-square test of independence was used to verify the association between the sociodemographic and clinical characteristics of the patients. The test analyzes the existence of a significant association between categorical variables, under the null hypothesis that the variables are independent and the alternative hypothesis that the variables are dependent. A significance level $\alpha = 0.05$ was adopted for all tests. Thus, for p-value ≥ 5%, the null hypothesis was not rejected. The analyses were performed with the R software version 4.4.2 (R Core Team, 2024).

RESULT

Table 1 shows the sociodemographic profile of the patients. The mean age was 54.4+/-19.8 years and most were aged between 41 and 80 years (70.6%). Regarding gender, the majority were men (58.8%).

TABLE 1 — Characterization of the sociodemographic profile of the patients (n = 17)

Variable	Group	Total
Age, mean (SD)		54,4 (19,8)
Age group, n (%)	0-20	1 (5,9)
	21-40	2 (11,8)
	41-60	7 (41,2)
	61-80	5 (29,4)
	>80	2 (11,8)
Gender, n (%)	Female	7 (41,2)
	Male	10 (58,8)

Table 2 details the comorbidities and reasons for the placement of gastric gastrostomy by tube (GGT). Overall, 52.9% had no comorbidities, Among those who did (47.1%), the most frequent were categorized as diabetes mellitus and neurological (37.5% each), followed by ulcerative and vascular colitis (12.5% each), The main reason for placing GGT was neurological (70.6%), with stroke being the most common cause (41.7% of neurological reasons), followed by COVID-19 (16.7%) and cerebral palsy (25%). Other reasons were dysphagia (11.8%) and trauma (11.8%). The majority (76.5%) were not using antibiotics and none had infectious complications.

TABLE 2 — Characterization of the sample according to comorbidities and reasons for placing GGT

Has comorbidities, n (%)	No	9 (52,9)
	Yes	8 (47,1)
Comorbidities, n (%)	Diabetes mellitus	3 (37,5)
	Neurological	3 (37,5)
	Ulcerative colitis	1 (12,5)
	Vascular	1 (12,5)
Reason for placing the GGT, n (%)	Malnutrition	1 (5,9)
	Dysphagia	2 (11,8)
	Neurological	12 (70,6)
	Trauma	2 (11,8)
Neurological reasons, n (%)	Stroke	5 (41,7)
	COVID	2 (16,7)
	Status epilepticus	1 (8,3)
	Guillain-Barré	1 (8,3)
	Cerebral palsy	3 (25,0)
Antibiotic in use, n (%)	No	13 (76,5)
	Yes	4 (23,5)
Infectious complications, n (%)	Hassle-free	17 (100,0)
	There were complications	0 (0,0)

Table 3 shows the description of the placement of GGT in the sample. The majority (88.2%) did not need to be transferred. The time until GGT placement varied greatly, with the majority (58.8%) having been placed less than 1 month earlier (time 0). Other frequent times were 1 month (17.6%) and 2 months (11.8%) after admission, only 1 had GGT placed after 3 months and another after 29 months; the majority (64.7%) had already withdrawn the GGT at the time of the analysis, and most withdrawals occurred between 0 and 1 year after placement (72.7%).

TABLE 3 — Characterization of the sample according to the GGT placement

Variable	Category	Total
There was a pass-through, n (%)	No	15 (88,2)
	Yes	2 (11,8)
Time to GGT placement (months), n (%)	0	10 (58,8)
	1	3 (17,6)
	2	2 (11,8)
	3	1 (5,9)
	29	1 (5,9)
Removed GGT, n (%)	Not yet withdrawn	6 (35,3)
	Yes	11 (64,7)
Time to withdrawal of GGT (years), n (%)	0-1	8 (72,7)
	1-2	2 (18,2)
	2-3	1 (9,1)

Association Analysis

Table 4 presents the analysis of the association between the time until GGT withdrawal and the age group, considering 3 categories of time in years: 0-1, 1-2 and 2-3. The p-value was calculated using the chi-square test. Among those who had GGT removed at 0-1 years (n

= 8), the highest proportion belonged to the 61-80 year age group (50%, n = 4), followed by 41-60 years (25%, n = 2). The 0-20 and >80 age groups contributed 11% (n = 1) and 13% (n = 1), respectively. In the group with a withdrawal time of 1-2 years (n = 2), 50% (n = 1) were between 41-60 years, and the other 50% (n = 1) were older than 80 years. The group with withdrawal at 2-3 years (n = 1) was in the 41-60 age group. There was no statistically significant association between the time until GGT withdrawal and the age group (p = 0.[6]).

TABLE 4 — Analysis of the association between time to removal of GGT and age group

	Time until withdrawal (years)			
Variable	0-1 n= 8	1-2 n = 2	2-3 n = 1	p-value [1]
Age group, n (%)				0.6
0-20	1 (11%)	0 (0%)	0 (0%)	
21-40	0 (0%)	0 (0%)	0 (0%)	
41-60	2 (25%)	1 (50%)	1 (100%)	
61-80	4 (50%)	0 (0%)	0 (0%)	
>80	1 (13%)	1 (50%)	0 (0%)	

[1] Chi-square test

Table 5 presents the reasons for the placement of GGT and the sociodemographic and clinical factors that led to its application.

TABLE 5 — Analysis of the association between the reasons for placing the GGT and the patients' sociodemographic and clinical factors

Variable	Malnutrition n = 1	Dysphagia n = 2	Neurological n = 12	Trauma n = 2	p-value [1]
Age group, n (%)					0,040
0-20	0 (0%)	0 (0%)	0 (0%)	1 (50%)	
21-40	0 (0%)	0 (0%)	2 (17%)	0 (0%)	
41-60	0 (0%)	1 (50%)	6 (50%)	0 (0%)	
61-80	0 (0%)	0 (0%)	4 (33%)	1 (50%)	
>80	1 (100%)	1 (50%)	0 (0%)	0 (0%)	
Time to withdrawal (years), n (%)					0,066
0-1	0 (0%)	2 (100%)	4 (67%)	2 (100%)	
1-2	1 (100%)	0 (0%)	1 (17%)	0 (0%)	
2-3	0 (0%)	0 (0%)	1 (17%)	0 (0%)	
Time to placement (months), n (%)					>0.9
0	1 (100%)	1 (50%)	6 (50%)	2 (100%)	
1	0 (0%)	1 (50%)	2 (17%)	0 (0%)	
2	0 (0%)	0 (0%)	2 (17%)	0 (0%)	
3	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	
29	0 (0%)	0 (0%)	1 (8.3%)	0 (0%)	
Comorbidities, n (%)					0,067
DM	0 (0%)	1 (50%)	2 (50%)	0 (0%)	
Neurological	0 (0%)	1 (50%)	2 (50%)	0 (0%)	
RCU	0 (0%)	0 (0%)	0 (0%)	1 (100%)	
Vascular	1 (100%)	0 (0%)	0 (0%)	0 (0%)	
There was a pass-through, n (%)					0,8
Not	1 (100%)	2 (100%)	10 (83%)	2 (100%)	
Yes	0 (0%)	0 (0%)	2 (17%)	0 (0%)	

[1] Chi-square test

Table 6 presents the analysis of the association between infectious complications and antibiotic use. Since none of the patients had infectious complications, it was not possible to establish statistical associations between the variables analyzed. These data suggest a low occurrence of infectious complications in the group evaluated.

TABLE 6 — Analysis of the association between infectious complications, antibiotic use, and comorbidities

	Infectious complications	
Variable	Complications-free n = 17	There were complications n = 0
Antibiotic in use, n (%)		
No	13 (76%)	0 (0%)
Yes	4 (24%)	0 (0%)
Comorbidities, n (%)		
Diabetes mellitus	3 (38%)	0 (0%)
Neurological	3 (38%)	0 (0%)
Ulcerative colitis	1 (13%)	0 (0%)
Vascular	1 (13%)	0 (0%)

DISCUSSION

After analyzing the epidemiological results obtained in this data collection, the fact that it is not possible to correlate the patient's age with his early rehabilitation and return to oral feeding goes against the results previously described in the literature, which in turn point to younger patients as having a greater tendency to remove GGT by recovery. In addition, despite the small volume of scientific substrate found in the databases regarding the removal of GGT, another factor that predisposes to its removal also stands out, that is, the procedure due to head and neck neoplasms, a factor that was not present in the sample studied.[8] During the period in which the data were collected, 3 cases of attempted endoscope progression were recorded in patients with head and neck neoplasms; however, due to the advanced stage of the lesions, it was not possible to perform the procedure and the patients, therefore, did not meet the inclusion criteria. In these cases, early oncological diagnosis could have avoided failure, and consequently positively influenced the final prognosis.

This sample indicated, with statistical significance, that age influenced the reason for the placement of GGT, allowing a better understanding of the epidemiological profile. Taking into account that many elderly people have an indication for the passage of GGT due to malnutrition, it is possible to draw a parallel with the literature, which in turn indicates nutritional scores to determine the best time, ensuring greater survival.[9] Understanding the epidemiological patterns of the services is, therefore, fundamental to know what type of evaluation to carry out, aiming at better medical care,

In addition, it was observed that neurological causes for GGT predominated among those who removed the tube in less than 1 year, which corroborates findings already described in other articles, which demonstrated a mean time of 5 months in neurological involvement, either due to rehabilitation that allowed the return to oral diet, or due to lack of improvement in the status in force of use of GGT.[10]

In addition, in the present sample, it was possible to observe that the time required for GGT placement to be indicated predominated at 10 months (58%), a result that was in line with that obtained and published by another national reference service, where approximately 58% of the sample was also submitted to GGT in 10 month.[11] Despite the early indication in more than half of the cases, it proved to be accurate, considering that about 64% remained with GGT for more than 1 year.

Finally, the results obtained showed the absence of infectious complications, despite the low number of cases in which antibiotics were prescribed. This result may serve to question the current protocols of medical conduct postulated in the international literature on the subject. Currently, antibiotic therapy is recommended, preceding the procedure, mainly penicillins, for the prophylaxis of surgical wound infection. Depending on the method used for the procedure, there was no statistical significance in the causal relationship between antibiotic prophylaxis and lower rates of surgical wound infection.[12,13] Thus, the present study suggests that this conduct should not be applied routinely, so that the indication or not should actually be individualized according to the infection rates of each service. Thus, patients are spared from higher morbidity associated with the inadvertent prescription of antimicrobial agents, and health systems are avoided from being unnecessarily burdened during the management of complex patients, such as those with gastrostomies.

CONCLUSION

GGT is the current method of choice for enteral feeding in many patients who need it to maintain adequate nutritional status, with varying comorbidities. However, there is a lack of national studies related to the subject, in regard to the profile of patients undergoing the procedure, possible complications and how they can be avoided. It is possible to establish a standard of characteristics for each patient in whom the procedure was indicated and individualize it in terms of care, technique used, prophylaxis, and even define contraindications for those at higher risk.

Authors' contributions

Isabelle Terumi Tanioka Corrêa - Formal Analysis, Investigation, Writing (original draft)
Roberto Oliveira Basso - Formal Analysis, Methodology
Leonardo Moreira Dias - Writing (proofreading and editing)
Carlos Roberto Naufel Junior - Conceptualization
Guilherme Andrade Coelho - Conceptualization

REFERENCES

1. Gauderer JP, Ponsky JL, Izant RJ. Gastrostomy without laparotomy: a percutaneous endoscopic technique. Journal of Pediatric Surgery. 1980;15(6):872–5. https://doi.org/10.1016/s0022-3468(80)80296-x
2. Rahnemai-Azar AA, Rahnemaiazar AA, Nagshizadian R, Kurtz A, Farkas DT. Percutaneous endoscopic gastrostomy: indications, technique, complications and management. World Journal of Gastroenterology. 2014;20(24):7739–51. https://doi.org/10.3748/wjg.v20.i24.7739
3. Choi IH, Cho YK. Percutaneous endoscopic gastrostomy: procedure, complications and management. Brain Neurorehabilitation. 2022;15(1):e2. https://doi.org/10.12786/bn.2022.15.e2
4. Hucl T, Spicak J. Complications of percutaneous endoscopic gastrostomy. Best Practice & Research Clinical Gastroenterology. 2016;30(5):769–81. https://doi.org/10.1016/j.bpg.2016.10.002
5. Lipp A, Lusardi G. Systemic antimicrobial prophylaxis for percutaneous endoscopic gastrostomy. Cochrane Database of Systematic Reviews. 2013;(11):CD005571. https://doi.org/10.1002/14651858.CD005571.pub3
6. Mandal A, Kesar V, Gonzalez Z, Roy N, Kanth R, Roy P. Prophylactic antibiotics for PEG tube placement: an updated meta-analysis of randomized controlled trials. The American Journal of Gastroenterology. 2019;114(Suppl):S326. https://doi.org/10.14309/01.ajg.0000591792.48999.48
7. Mondorf A, Amini C, Graf C, Michael FA, Blumenstein I, Jung M, et al. Risk factors and role of antibiotic prophylaxis for wound infections after percutaneous endoscopic gastrostomy. Journal of Clinical Medicine. 2023;12(9):3175. https://doi.org/10.3390/jcm12093175
8. Cukier C, Magnoni CD, Poletti P, Tacla M. Gastrostomia endoscópica em pacientes com cardiopatia complicada. Arquivos de Gastroenterologia. 2000;37(4):208–12.
9. Kalkan Ç, Kartal AÇ, Karakaya F, Tüzün A, Soykan I. Utility of three prognostic risk scores in predicting outcomes in elderly non-malignant patients after percutaneous gastrostomy. The Journal of Nutrition. Health and Aging. 2017;21(10):1344–48. https://doi.org/10.1007/s12603-016-0853-4
10. Pineda-Cortés D, Paz-Rodríguez F, Trujillo-de Los Santos Z, Sánchez-Guzmán MA, Nava-Galán MG, Santana-Aguilar E, et al. Exploratory study on gastrostomy in patients with neurological diseases: usefulness and impact. Neurología. 2022;37(6):428–33. https://doi.org/10.1016/j.nrleng.2019.04.003
11. Cukier C, Magnoni CD, Poletti P, Tacla M. Gastrostomia endoscópica em pacientes com cardiopatia complicada. Arquivos de Gastroenterologia. 2000;37(4):208–12. https://doi.org/10.1590/S0004-28032000000400004
12. Jafri NS, Mahid SS, Minor KS, Idstein SR, Hornung CA, Galandiuk S. Meta-analysis: antibiotic prophylaxis to prevent peristomal infection following percutaneous endoscopic gastrostomy. Alimentary Pharmacology & Therapeutics. 2007;25(6):647–56. https://doi.org/10.1111/j.1365-2036.2007.03247.x
13. Tae CH, Lee JY, Joo MK, Park CH, Gong EJ, Shin CM, et al. Clinical practice guideline for percutaneous endoscopic gastrostomy. Gut and Liver. 2023;18(1):10–26. https://doi.org/10.5009/gnl230146