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Artigo Original

External dacryocystorhinostomy with bicanalicular intubation – retrospective analysis of results and complications

José Alberto Lemos, Rui Carvalho, Carlos Menezes, Rita Gonçalves, Pedro Coelho
Hospital Pedro Hispano

RESUMO

Objetivos: Avaliar as taxas de sucesso cirúrgico e as complicações dos doentes com obstrução adquirida do ducto nasolacrimal submetidos a cirurgia de dacriocistorrinostomia (DCR) com entubação bicanalicular.
Métodos: Avaliaram-se retrospetivamente 63 DCR externas realizadas em 58 doentes. As variáveis estudadas foram: idade, sexo, sintomas e sinais iniciais, complicações, taxa de sucesso cirúrgico e reintervenções. Definiu-se sucesso cirúrgico pela presença de patência anatómica associada a resolução dos sintomas de epífora (sucesso total) ou a melhoria dos sintomas de epífora (sucesso parcial). Os casos com persistência de epífora e inexistência de patência anatómica ou os casos com recorrência de dacriocistite foram classificados como insucessos.
Resultados: A idade média dos doentes foi de 63,13 anos, com predomínio do sexo feminino (84,5%). O sintoma inicial mais frequente foi a epífora (71,4%). Das 63 cirurgias, 55 foram primeiras cirurgias e 8 reintervenções. As complicações intraoperatórias e pós-operatórias foram pouco frequentes. Nas complicações pós-operatórias destacam-se as associadas com o tubo de silicone, com 3 casos de prolapso do tubo e 2 casos de extrusão precoce do tubo. A cirurgia foi um insucesso em 6 casos (9,5%).
Conclusões: A taxa de sucesso cirúrgico (total + parcial) com a DCR externa foi de 90,5%. Esta técnica cirúrgica constitui uma boa opção no tratamento das obstruções do ducto nasolacrimal, pelas elevadas taxas de sucesso e baixa taxa de complicações. No entanto, a entubação intraoperatória não é isenta de complicações.

Palavras-chave
Dacrioscistorrinostomia externa; entubação bicanalicular; obstrução adquirida do ducto nasolacrimal; epífora; dacriocistite.

ABSTRACT

Purpose: To evaluate surgical success rates and complications in patients with acquired nasolacrimal duct obstruction that underwent external dacryocystorhinostomy (DCR) with bicanalicular intubation.
Methods: 63 external DCR's performed in 58 patients were retrospectively evaluated. The variables analyzed were: age, gender, initial signs and symptoms, complications, surgical success

rate and reoperations. Surgical success was defined by the presence of anatomical patency associated with resolution of epiphora (full success) or improvement of epiphora (partial success). All cases with persistent epiphora without anatomical patency or cases of recurrent dacryocystitis were classified as unsuccessful.

Results: Patients mean age was 63.13 years, with female predominance (84.5%). Epiphora was the most frequent initial symptoms (71.4%). Of the 63 surgeries, fifty-five were first interventions and 8 were reoperations. Intraoperative and postoperative complications were unusual. In the postoperative complications, we must emphasize those related with silicone tube, with 3 cases of tube prolapse and 2 case of early tube extrusion. Surgery was unsuccessful in 6 cases (9,5%).

Conclusions: Surgical success rate (full + partial) with external DCR was 90,5%. This surgical technique is a great option in the treatment of nasolacrimal duct obstructions, with high surgical success rates and low rate of complications. However, intraoperative intubation is not free of complications.

Key-words

External dacryocystorhinostomy; bicanalicular intubation; nasolacrimal duct acquired obstructions; epiphora; dacryocystitis.

INTRODUCTION

Nasolacrimal duct (NLD) obstruction is a common problem that occurs more frequently in females and results in significant stress for the patient.[1] A study in Minnesota showed an incidence of 20.24 cases per 100 000 people from 1976 to 2000.[2] NLD obstruction may be idiopathic, congenital, traumatic, iatrogenic, infectious, associated with nasal pathology, foreign bodies or tumors. Idiopathic NLD obstructions account for 75.1% of all cases.[3] Despite the obstruction is considered idiopathic, usually it results of nonspecific, edematous or allergic inflammation or atrophic condition of nasal mucosa in the region of NLD.[4] The most common symptoms of acquired NLD obstruction are epiphora and acute or chronic dacryocystitis. Epiphora associated with NLD obstruction is a common ophthalmic problem and accounts for approximately 3% of all ophthalmologic clinic visits.[5]

Surgical treatment of acquired NLD obstruction consists of a dacryocystorhinostomy (DCR) that involves the creation of an alternative route for the tear drainage (directly connecting the lacrimal sac into the nasal cavity, bypassing the blocked NLD). This can be done by an external approach (external DCR) or through the nasal cavity using an endoscope (endonasal DCR).

External DCR was first described in 1904 by Toti[6] and latter modified by Dupuy-Dutemps in 1921[7] that added the suture of the lacrimal sac with the nasal mucosa, creating a fistula lined by epithelium. External DCR is the gold standard procedure in the treatment of NLD obstruction with surgical success rates between 85-95%[8-14], superior to those reported for endonasal DCR (from 63 to 90%).[15-17]

One innovation in external DCR surgical technique was the temporary intubation of lacrimal drainage system. First reports appeared in 1950, using monocanalicular intubation with polyethylene tubes in cases where canalicular obstruction was also present. In the late 1950s, intubation was bicanalicular.[18] Silicone tube was introduced in 1967 by Gibbs and is currently the material of choice for this procedure.[19] Ophthalmologists using routine bicanalicular intubation associated with DCR argue that tube presence helps to maintain the patency of the surgical anastomosis and intranasal ostium until epithelialization is complete.[20] However, an opposite group argues that silicone tube presence causes complications and has no advantage due to the high efficacy of external DCR without intubation.[21]

The purpose of this study was to evaluate the efficacy of external DCR with bicanalicular intubation in the treatment of NLD obstruction in Ophthalmology Department of Pedro Hispano Hospital.

MATERIALS AND METHODS

A retrospective observational study was conducted. Medical records of all patients submitted to external DCR in Ophthalmology Department of Pedro Hispano Hospital from January 2012 through June 2014 were reviewed. One patient was excluded because he missed all postoperative consults. A total of 63 external DCR were included, in 58

patients (2 patients underwent bilateral external DCR and 3 patients were submitted to reoperations during study).

Data collected were: age, gender, surgery eye, follow-up time, presentations symptoms (epiphora, acute or chronic dacryocystitis), history of previous trauma to lacrimal drainage system, intraoperative and postoperative complications and outcome.

Primary outcome measure that we used was efficacy. This was defined as success (full or partial) or failure. Anatomic patency was evaluated by the instillation of saline solution in lacrimal drainage system and considered positive if minimum or no reflux was observed through the opposite canaliculus. Full success was defined as resolution of epiphora together with anatomic patency and partial success was defined as the improvement of epiphora with anatomic patency. Cases with persistent epiphora (without improvement) and without anatomic patency were classified as failure. Dacryocystitis recurrence was also considered as failure.

Patients were divided into 2 groups considering the surgical outcome: success or failure that was evaluated 2 to 6 months after surgery, according to the criteria defined above. We also tried to relate study variables with the surgical outcome.

Secondary outcomes measured were the intraoperative and postoperative complications.

All external DCR with bicanalicular intubation were done with the following surgical technique: patient under general anesthesia combined with loco-regional block and nasal packing; Straight incision with opening of the skin up to the periosteum with about 1.5 to 2.0 cm, on the nasal dorsum; osteotomy was fashioned with a Citelli's punch; "U"-shaped incision of the lacrimal sac and nasal mucosa; Posterior flaps suture; introduction of O'Donoghue silicone tubes in lacrimal drainage system; anterior flaps suture; wound closure by anatomic planes; Skin sutures were removed after 1 week and silicone tubes were removed 3-4 months after surgery.

All surgeries were done by a surgeon specialist in Oculoplastics (RC) or by one of 6 Ophthalmology trainees that were with him in the operating room during the study period.

IBM Statistical Package for Social Sciences (SPSS) 20.0 was used for statistical analysis. An assessment of normality was done initially. All numerical data are expressed either as the median (minimum-maximum) or as the mean ± standard deviation (SD). All categorical variables are expressed as the number and percentage (n, %). Chi-square test or Fisher's test were used to evaluate the influence of variables as sex, type of surgery (first or reinterventions) and main complaint in the surgical success. For the statistical analysis only 2 surgical results were considered: success (total and partial) and failure, due to the few cases of partial success.

Statistical significance was set at $p<0.05$ for all analysis.

RESULTS

The patient's mean age was 63.13±12.56 years, ranging from 36 to 84 years. There was a clear predominance of female gender with 49 cases (84.5%) (Table 1). Mean follow-up was 6.4 months (range from 4 to 24 months). Of the 63 surgeries, 32 were done in the left eye (50.8%) and 31 in the right eye (49.2%).

Epiphora was the most frequent symptom described by the patients (71.4%), followed by recurrent acute dacryocystitis (38.1%) and chronic dacryocystitis (28.6%) (Table 1). Note that many patients presented more than one symptom and can be grouped by the sum of symptoms (Table 2). Analyzing the surgical results according to the group of symptoms, there were no statistically significant differences ($\chi2$ (4) = 6.04; p = 0.196; n = 63). Nevertheless, it should be noted that half of failures (3) occurred in patients whose main complaint was only recurrent acute dacryocystitis (Table 2).

No patient had history of trauma of the lacrimal drainage system.

The surgical success rate of the 63 surgeries (55 primary interventions and 8 reinterventions) was 90.5%: a full

Table 1 | Baseline Patient's Characteristics and Symptoms.

Variable	
Age, years, mean ± standard deviation (minimum and maximum)	63,13±12,56 (36-84)
Gender (Female/Male), n	49/9
Surgery Eye (Left Eye/Right Eye), n	32/31
Symptoms	
Epiphora, n (%)	45 (71,4%)
Acute Dacryocystitis, n (%)	24 (38,1%)
Chronic Dacryocystitis, n (%)	18 (28,6%)

Table 2 | Patient's Analysis (accordingly to symptoms and group of outcome).

Group	Only Epiphora	Only Acute Dacryocystitis	Only Chronic Dacryocystitis	Epiphora + Acute Dacryocystitis	Epiphora + Chronic Dacryocystitis
Sucess	20 (95,2%)	12 (80,0%)	2 (66,7%)	8 (88,9%)	15 (100%)
Failure	1 (4,8%)	3 (20,0%)	1 (33,3%)	1 (11,1%)	0 (0%)
Total	21 (33,3%)	15 (23,8%)	3 (4,8%)	9 (14,3%)	15 (23,8%)

success in 54 eyes (85.7%), partial success in 3 patients (4.8%) and only 6 cases of failures (9.5%), with persistent epiphora (3 of them were already reoperated during the study, 1 awaits scheduling and 2 refused new surgery). Two of the 6 cases of failure occurred in patients with premature silicone tube extrusion (in one case 1 week after surgery and in the other case 3 weeks after surgery) and 1 case of failure occurred in a wound infection.

Analyzing only the primary interventions (n=55), surgical success rate was 89.1%: a full success in 46 eyes (83.6%), partial success in 3 patients (5.5%) and only 6 cases of failures (10.9%). The surgical success rate of the reinterventions (n=8, 3 from abroad and 5 from our service) was 100%, and all were a full success. (Table 3) However, this difference in the surgical success rate between primary surgeries and reinterventions was not statistically significant (Fisher p=1.00; n=63).

The surgical success rate obtained in male gender was 100% and in female gender 88.9% (48 success in 54 eyes). However, this difference also was not statistically significant (Fisher p= 0.581; n=63).

Intraoperative and postoperative complications were uncommon. Intraoperative complication included: 5 cases of diffuse haemorraghe (7.9%) and 2 cases of lesion of nasal mucosa (3.2%). There were no cases of lesion of lacrimal sac. Postoperative complication were: 1 case of wound infection (1.6%), 1 case of abundant epistaxis in the first week (1.6%), 1 case of subcutaneous emphysema (1.6%) and some complications associated with silicone tube: 3 cases of tube prolapse (4.8%) and 2 cases of premature tube extrusion (3.2%). There were no cases of suture dehiscence (Table 4).

None of the cases presented difficulties in intraoperative intubation.

Table 3 | Patient's Analysis (accordingly to type of intervention and group of outcome).

Group	First Surgery	Reintervention	Total
Full Sucess	46 (83,6%)	8 (100%)	54 (85,7%)
Partial Sucess	3 (5,5%)	0 (0%)	3 (4,8%)
Failure	6 (10,9%)	0 (0%)	6 (9,5%)

DISCUSSION

In our study, most of the patients were female (84.5%), in agreement with the literature.[4,12,20] Mean age was 63.13±12.56 years, similarly to previous studies.[12,20]

The most frequent symptom was epiphora (71.4%) and many patients presented with more than 1 symptom. None of the groups of symptoms presented statistically significant relation with the occurrence of failure; however, the reduced number of failures in our study is a limitation to this analysis and may represent a bias. In our study the percentage of patients with epiphora was inferior to that reported in previous studies (over 90%)[4,12], which may be explained by its retrospective nature, in other words, when the patient

Table 4 | Patient's Analysis (accordingly to intraoperative and postoperative complications and group of outcome).

Group	Diffuse Haemorrhage	Wound Infection	Nasal Mucosa Lesion	Epistaxis	Subcutaneous Emphysema	Tube Prolapse	Tube Extrusion
Sucess	5 (7,94%)	0	3 (4,76%)	1 (1,59%)	1 (1,59%)	3 (4,76%)	0
Failure	0	1 (1,59%)	0	0	0	0	2 (3,17%)
Total	5 (7,94%)	1 (1,59%)	3 (4,76%)	1 (1,59%)	1 (1,59%)	3 (4,76%)	2 (3,17%)

presented with other main complaints occasionally the presence of epiphora may not have been recorded.

External DCR success rates reported in the literature are high (between 80 and 98%)[12,13,22,23]. Despite this high success rate, intense research has been done to improve surgical technique, with intraoperative use of substances like mitomycin C[24] or 5-fluorouracil[25] or through intubation of the lacrimal drainage system.[18,19]

The intraoperative bicanalicular intubation of the lacrimal drainage system during external DCR is a controversial issue, with several authors claiming that routine intubation has no benefit due to the high efficacy of external DCR without intubation and causes complications and costs.[21] Therefore, they only reserve intubation to the following indications: atrophic lacrimal sac, common canaliculus obstruction, reoperations, inadequate nasal mucosa and/or lacrimal sac flaps and endoscopic DCR.[26]

External DCR with bicanalicular intubation is the routine protocol in all surgeries in our Ophthalmology Department (whether primary surgeries our reinterventions). We choose to do intubation in all patients because we consider it is a simple and rapid procedure with little costs and with the goal of reducing the closure of the new route for the tear recently created, since the silicone tube would function as a mechanical barrier to prevent the formation of fibrous tissue. Furthermore, the silicone tube reduces the risk of secondary canalicular obstructions that may occur due to the small lacerations induced by the lacrimal probes during the manipulation of the lacrimal sac and canaliculi. Our choice is also supported by several studies that reported success rates between 91.6-95%[27] and a reintervention rate of 2%.[28] Note that 2 of the 6 cases of failure in our study occurred in patients with premature tube extrusion, that may have contributed to that result.

Previous studies reported different timings for removal of silicone tube, from 1 week until 6 months.[22] In our patients we choose to remove the silicone tubes after 3-4 months because we consider this is an adequate timing for the healing of tissues present in the surgical ostium.

In our study, the reinterventions (a total of 8) presented a surgical success rate of 100% (all full success). The surgical success rates for revision external DCR described in the literature are between 60 and 92%.[29-32] The higher success rate achieved in our study probably can be explained by the reduced number of reinterventions. Before submitting the patient to a reintervention, the cause of previous failure should be elicited through a detailed evaluation of all components of lacrimal drainage system. Recurrence can occur early or late after external DCR. Early recurrences usually are associated with inadequate flap anastomosis and/or failure to create a bone window at an appropriate localization and size during the DCR operation or SUMP syndrome (residual nasolacrimal sac after DCR). Late recurrences usually represent the development of hypertrophic granulation tissue due to a residual lamella in bone window or development of periosteum or nasal mucosa.

Intraoperative and postoperative complications were uncommon. Diffuse haemorrhage occurred in 7.9% of cases and complicates the surgery. However, in no case the bleeding was severe enough to compromise the surgery or patient's vital signs (as already described)[33], probably due to the precautions that were adopted, including a detailed preoperative evaluation of all patients and the use of adrenaline in the loco-regional block and phenylephrine or cocaine paste in nasal packing. Other relevant intraoperative complication was the lesion of nasal mucosa (3.2% of cases), probably secondary to the use of Citelli's punch that can perforate the nasal mucosa during the removal of bone spicules (because of its size).

The complications related with the silicone tube are the most prominent postoperatively: 3 cases of tube prolapse (4.8%) and 2 cases of premature tube extrusion (3.2%). These 2 cases culminated in surgical failure, as previously stated.

Nevertheless, other factors may influence the surgical success rate (in addition to the surgical complications): inappropriate size and/or localization of bone window, common canalicular obstruction, rinostomy cicatrization, active systemic disease or others.[34]

Some potential limitations of our study should be mentioned. The most important is related to the study design and its retrospective nature. A higher level of scientific evidence could have been obtained if a randomized prospective study with a control group has been done to evaluate the importance of intubation. Another limitation is the overall sample size and the reduced number of failures (only 6), which prevents further analysis of possible factors associated with increased risk of failure.

So we cannot affirm that bicanalicular intubation is associated with greater surgical success rate of external DCR. Additional studies evaluating this issue are needed, specifically prospective randomized studies that allow us to conclude about the importance of bicanalicular intubation in the external DCR surgical success rate.

CONCLUSION

In conclusion, our study showed an external DCR success rate of 90.5%, with 85.7% of full success and 4.8% of partial success. This high success rate and the low incidence

of complications maintain the external DCR as the gold standard surgical technique for acquired NLD obstructions. Bicanalicular intubation is a simple, safe and easy procedure, although not without complications.

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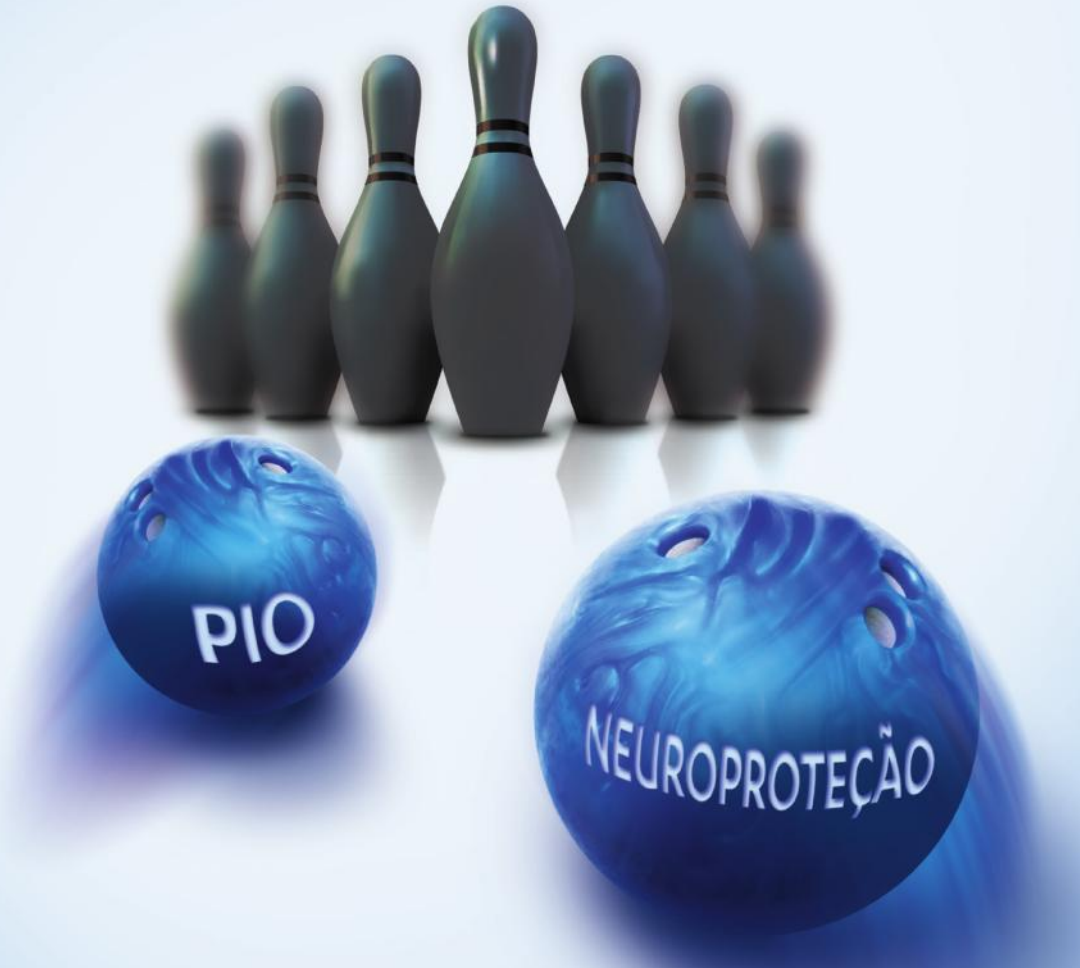

Folheto informativo
Suplemento alimentar 250 mg de citicolina e 0,75 mg de zinco por cápsula. Composição e apresentação: Citidina 5´-difosfocolina (citicolina) – 54,11%; Agentes de volume: Celulose microcristalina; Agente de revestimento: Gelatina; Antiaglomerantes: Talco, Estearato de magnésio; Água; Antiaglomerante: Sílica coloidal anidra; Óxido de Zinco – 0,20%. Embalagem de 60 cápsulas brancas. Propriedades: EyeCare NPO é um produto à base de citicolina e zinco que contribui para a manutenção de uma visão normal. A citicolina é uma substância que, no organismo humano, é metabolizada em colina. Esta intervém em diversos processos fisiológicos, nomeadamente em neuropatias ópticas como glaucoma, ambliopia e neuropatia óptica isquémica. A colina existe de forma natural no organismo humano e é um interveniente essencial na formação de células nervosas e na síntese de neurotransmissores. O zinco é o segundo mineral mais abundante no organismo humano e está presente em cerca de 200 enzimas. É um interveniente essencial em diversos processos fisiológicos nomeadamente no desenvolvimento do sistema neurológico, imunitário e reprodutor, entre outros. A citicolina e a função visual: A citicolina é um elemento fundamental na função visual uma vez que, como referido anteriormente, participa nos processos metabólicos das células nervosas, nomeadamente das que estão envolvidas na visão. A citicolina desempenha várias funções no ciclo deste tipo de células, uma vez que: 1) intervém na síntese de fosfatidilcolina, um componente primário das membranas neuronais; 2) é usada na síntese de acetilcolina, um neurotransmissor responsável pela propagação de sinais nervosos; 3) promove a síntese de diversos fosfolípidos, responsáveis pela reparação e regeneração das sinapses. Um aporte adicional de citicolina, em caso de défice, é útil na integridade das células nervosas e na comunicação entre as mesmas. O zinco e a função visual: O zinco é um mineral que contribui para a manutenção de uma visão normal e está presente em grandes concentrações na retina, particularmente no epitélio pigmentar. No olho, o zinco desempenha várias funções: 1) é co-factor das enzimas anti-oxidantes da retina: desidrogenase e catalase; 2) está envolvido no metabolismo retiniano; 3) evita a peroxidação dos lípidos e, consequentemente, danos nas membranas lipídicas, 4) regula o aporte de vitamina A. Toma diária recomendada: Tomar 2 cápsulas de EyeCare NPO com um copo de água, salvo indicação em contrário dada pelo médico. Condições de conservação: EyeCare NPO deve ser conservado em local fresco e seco, abaixo dos 25ºC. Data de durabilidade mínima: Não consumir EyeCare NPO após a data indicada na embalagem. Advertências: Os suplementos alimentares devem ser utilizados para um estilo de vida saudável e não como substitutos de um regime alimentar variado e equilibrado. Não exceder a toma diária recomendada. Adequado a diabéticos, intolerantes ao gluten ou à lactose. Manter fora do alcance das crianças. Não recomendado em caso de hipersensibilidade ou alergia a algum dos constituintes de EyeCare NPO. Em caso de gravidez ou amamentação, a toma deve ser feita sob indicação médica. Distribuido por: DAVI II – FARMACÊUTICA S.A. Estrada Consiglieri Pedroso, 71, Edifício D – 6º - Queluz de Baixo - 2730-055 Barcarena – Portugal.

Suplemento Alimentar

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