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Open or closed sphincterotomy for treatment of the chronic anal fissure? (systematic review and meta-analysis)

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ABSTRACT *INTRODUCTION:* up to the present time, both open and closed lateral internal sphincterotomy (LIS) are considered by surgeons as fully comparable methods for eliminating the spasm of the internal sphincter in patients with chronic anal fissure. However, each method has a number of advantages and disadvantages.

AIM: determination of an effective and safe method of lateral subcutaneous sphincterotomy.

MATERIALS AND METHODS: a systematic overview and meta-analysis of studies, which compare the results of treatment after an open and closed lateral sphincterotomy was performed. The following has been evaluated: the incidence of fissure epithelialization, the postoperative morbidity, the recurrence rate, the incidence of anal incontinence (AI). Statistical processing has been carried out in the Review Manager 5.3 program.

RESULTS: the meta-analysis included 9 studies with the results of treatment of 452 patients after an open lateral sphincterotomy and 443 after a closed one. The groups were comparable in frequency of epithelialization of fissures (OR = 0.87; CI = 0.30; 2.53; $p = 0.8$), in terms of the number of postoperative complications (OR = 0.52; CI = 0.15; 1.76; $p = 0.29$), as well as the number of relapses of the disease (OR = 0.5; CI = 0.19; 1.31; $p = 0.16$). At the same time, the implementation of an open lateral sphincterotomy leads to the development of AI 2.05 times more often than the closed method (OR = 2.05; CI = 1.01; 4.16; $p = 0.05$).

CONCLUSION: during the treatment of the chronic anal fissure, in order to eliminate the spasm of the internal sphincter, it is advisable to use a closed method, in which the chance of AI is 2.05 times lower.

KEYWORDS: chronic anal fissure, CAF, spasm of the internal sphincter, lateral subcutaneous sphincterotomy, LIS

CONFLICT OF INTEREST: The authors declare no conflict of interest

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INTRODUCTION

It is generally recognized that the main role in the pathogenesis of chronic anal fissure (CAF) is played by the internal sphincter spasm; therefore, its elimination is fully justified in the treatment of this disease [1,2]. Among various methods of both medical and surgical relaxation of the internal sphincter, lateral internal sphincterotomy (LIS) is considered the most effective [3–7], which is why this technique was chosen as a control in the vast majority of studies [8–16]. At the same time, it is

considered that various options for performing this manipulation are comparable to each other according to the above criteria [17]. However, there is an opinion that in comparison with open lateral sphincterotomy, the closed technique allows achieving a more significant reduction in the intensity of pain syndrome, reducing the time of hospitalization and the risk of developing anal sphincter incontinence [18–22].

AIM OF THE STUDY

Assessment of the effective and safe method of lateral sphincterotomy.

MATERIALS AND METHODS

The systematic review and meta-analysis were performed in accordance with the international guidelines of the preferred reporting items for systematic reviews and meta-analyses checklist (PRISMA) [23]. The search for publications was carried out in the electronic databases of medical literature Medline and was completed in September 2021. The following keywords were

used in the search query: 'anal fissure', 'fissure in ano', 'sphincterotomy' and 'lateral internal sphincterotomy'. The search for publications was not limited by the date of publication of articles; language restrictions were also not applied. The publications included in the meta-analysis were selected according to the following criteria:

- Full-text articles (randomized studies only);
- Studies comparing open and closed lateral sphincterotomy in the treatment of chronic anal fissure.

Considered indicators:

1. The incidence of fissure epithelization.
2. The number of postoperative complications.

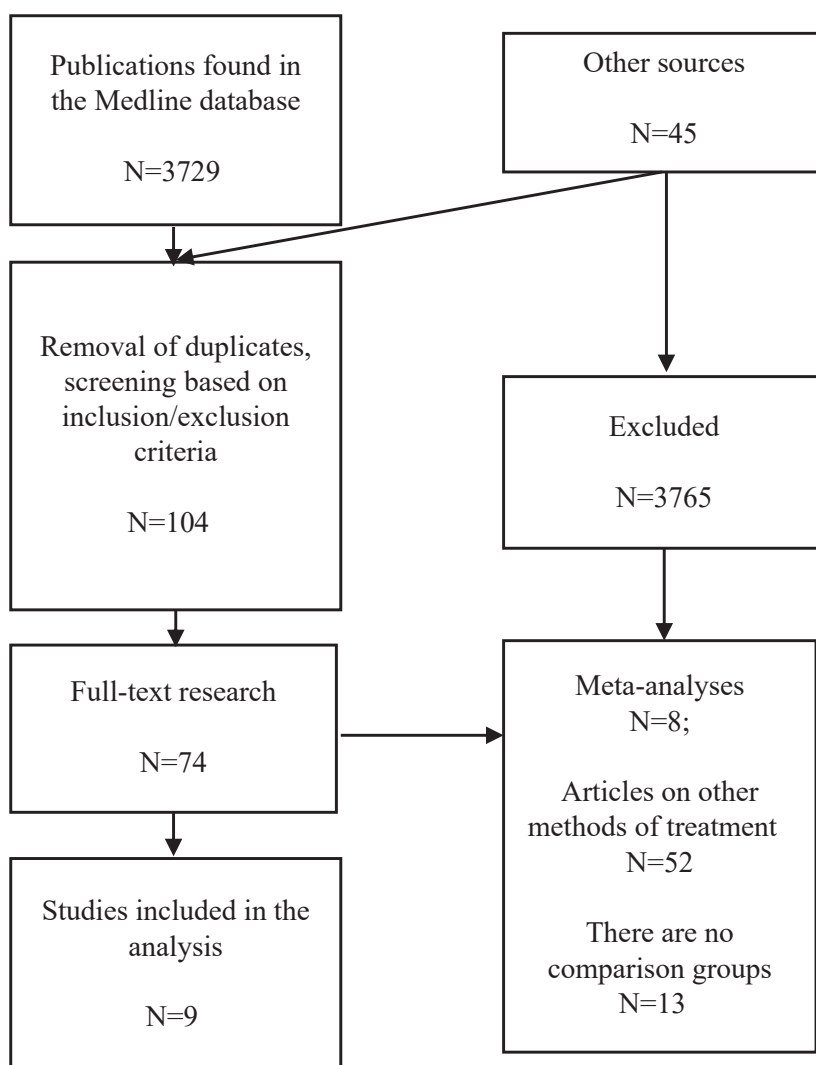


Рисунок 1. Диаграмма поиска источников литературы
Figure 1. Flow-chart for searching literature sources

Table 1. Characteristics of studies comparing the use of open and closed lateral subcutaneous sphincterotomy in the treatment of chronic anal fissure

Author	Year	Country	Observation period (months)	Method	N of patients	Healing of postoperative wounds, N	Complications, N	Postoperative ASI*, N	Recurrences, N
Akata et al.	2010	Iraq	6	Open	50	no data	7	14	4
				Closed	50	no data	5	10	4
Arroyo et al.	2004	Spain	24	Open	40	37	2	2	3
				Closed	40	36	2	1	4
Boulos et al.	1984	Great Britain	1	Open	14	14	2	2	no data
				Closed	14	14	9	3	no data
Ghayas et al.	2015	Pakistan	0,16	Open	47	no data	no data	10	no data
				Closed	47	no data	no data	2	no data
Gupta et al.	2013	India	12	Open	68	68	no data	0	0
				Closed	68	68	no data	0	0
Kortbeek et al.	1992	Canada	1,5	Open	54	51	4	no data	no data
				Closed	58	56	5	н/д no data	no data
Wiley et al.	2004	Australia	13	Open	40	38	3	10	no data
				Closed	36	35	1	2	no data
Sanniyasi et al.	2016	India	6	Open	34	no data	8	11	2
				Closed	30	no data	0	3	3
Sanabani et al.	2014	Egypt	6	Open	105	no data	1	5	2
				Closed	100	no data	11	7	6

3. The incidence of anal incontinence in the postoperative period.

4. The number of the disease recurrences.

For all the presented dichotomous indicators, the odds ratio (OR) was calculated with a coincidence interval (CI) of 95%.

Statistical heterogeneity among the studies was assessed using the χ^2 test. Heterogeneity was considered statistically significant at $p < 0.1$ and $I^2 > 50\%$.

Statistical analysis of the data when comparing the above methods was carried out using the Review Manager 5.3 program.

Search results:

3729 publications were found in the PubMed search engine in the Medline database when compiling a query containing the above keywords. During the subsequent screening of the literature, 104 articles were selected. In the future, the following ones were excluded:

literature reviews and meta-analyses — 8 articles; studies without a compare is on group — 13 publications; studies on other methods of anal fissure treatment — 52 articles. Thus, the analysis includes 9 publications that meet the inclusion criteria, all of which are prospective randomized (Fig. 1) [18,19,24–30]. The results of treatment of 452 patients after open lateral sphincterotomy and 443 after closed were analyzed. In studies assessed in accordance with the Cochrane risk of bias check list [31], the low risk of rejection of results in more than 75% of publications is determined only by the research reporting criterion. The criteria of the randomization method, the blinding of performers and researchers, the distribution of patients into groups and the completeness of the description of treatment results have a low risk of deviation (less than 50%) (Fig. 2).

The characteristics of the studies included in the work are given in Table 1.

RESULTS

Meta-analysis of the incidence of fissure epithelization

Information about the healing of lesions was demonstrated in 5 studies; the groups were comparable

to each other in the incidence of fissure epithelization ($OR = 0.87$; $CI = 0.30$; 2.53 ; $p = 0.8$). When analyzing the homogeneity of studies, their heterogeneity is noted $I^2 = 0\%$, $p = 0.74$ (Fig. 3).

Meta-analysis of the development of postoperative complications

In 7 presented studies, no statistically significant differences were found in the incidence of postoperative complications after treatment of chronic anal fissure using open and closed LIS techniques ($OR = 0.64$; $CI = 0.23$; 1.8 ; $p = 0.4$). When assessing the homogeneity of the groups in the publications, it was revealed that there were significant biases $I^2 = 54\%$, $p = 0.04$ (Fig. 4).

Meta-analysis of the development of postoperative anal sphincter incontinence

In 8 studies, when analyzing data on the incidence of development of postoperative ASI, it was found that performing an open lateral sphincterotomy increases the chance of developing ASI by 2.05 times compared to the closed method ($OR = 2.05$; $CI = 1.01$; 4.16 ; $p = 0.05$). There is no statistically significant heterogeneity among the studies $I^2 = 39\%$, $p = 0.13$ (Fig. 5).

Meta-analysis of the incidence of disease recurrences

In the 5 presented studies, there were no statistically significant differences in the incidence of the disease recurrences after treatment of chronic

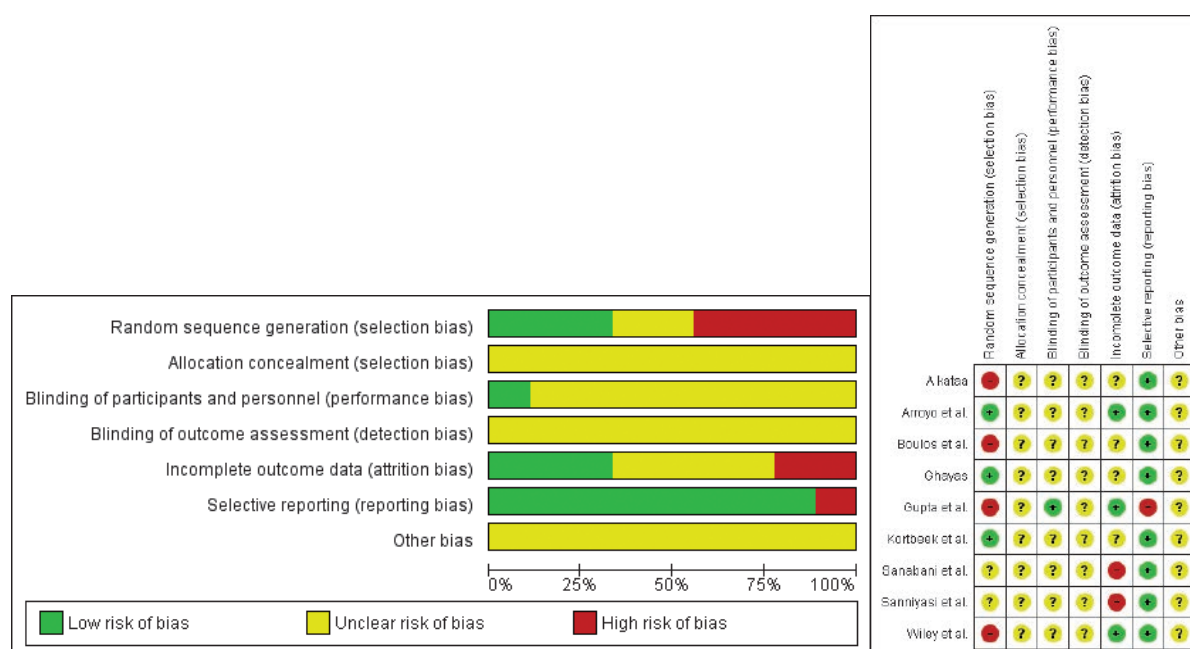


Figure 2. Assessing the risk of bias in studies according to the Cochrane risk of bias checklist

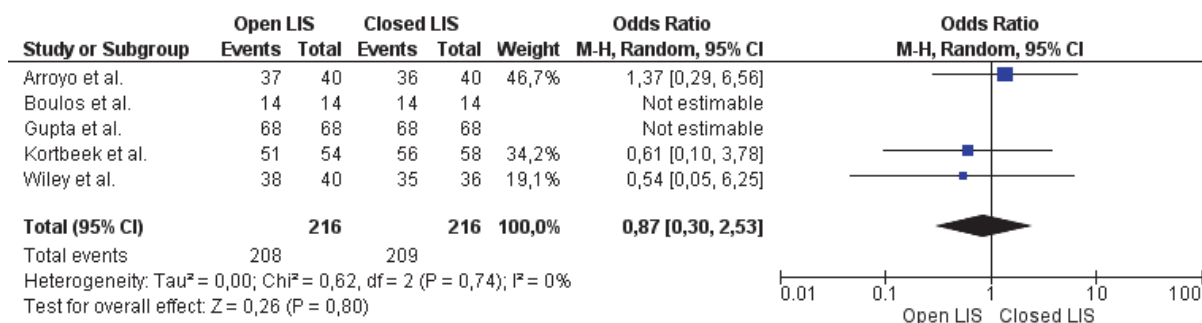


Figure 3. The incidence of epithelization of fissures in the treatment of CAF using open and closed LIS technique

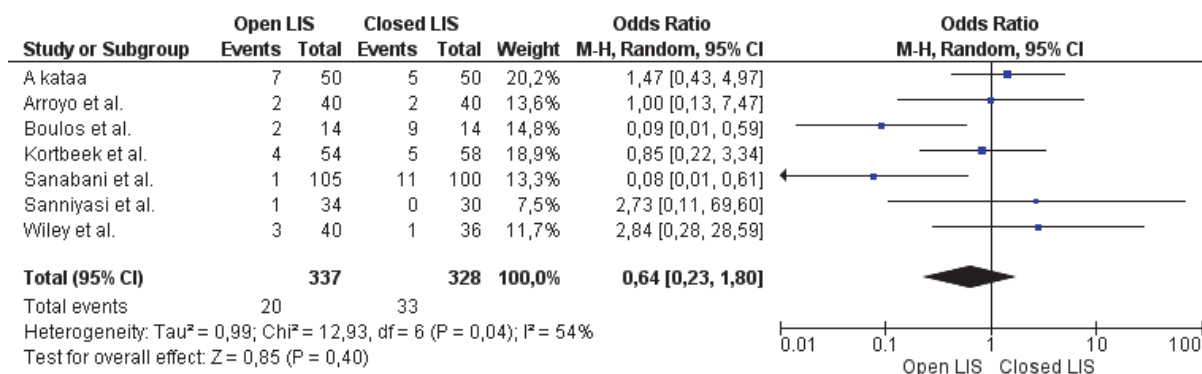


Figure 4. The incidence of postoperative complications in the treatment of CAF using open and closed LIS technique

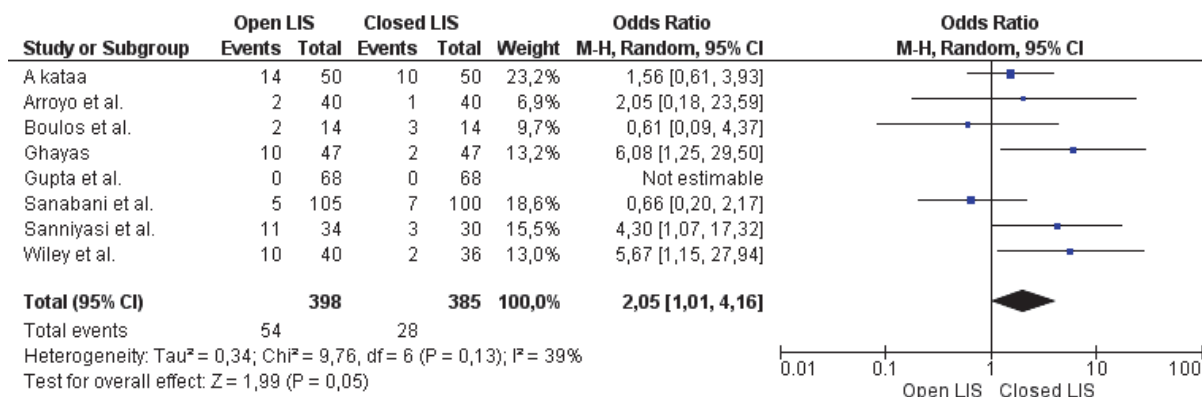


Figure 5. The incidence of postoperative anal incontinence in the treatment of CAF using open and closed LIS technique

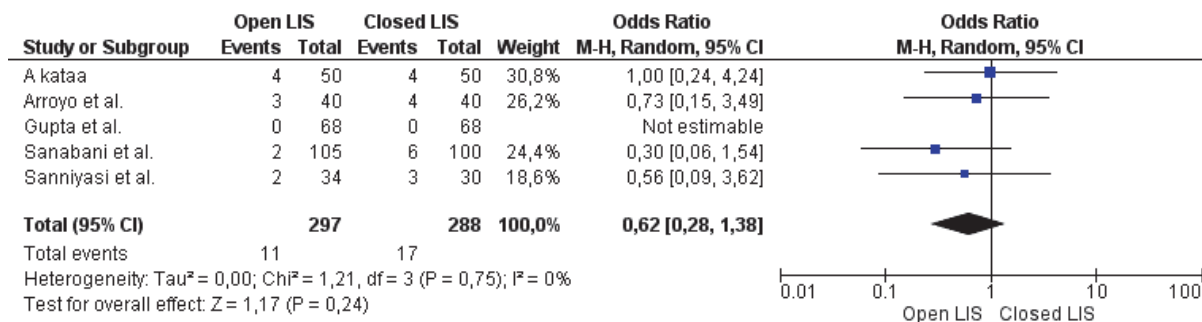


Figure 6. The incidence of recurrences in the treatment of CAF using open and closed LIS technique

anal fissure using open and closed lateral subcutaneous sphincterotomy (OR = 0.62; CI = 0.28; 1.38; $p = 0.24$). The studies are homogeneous $I^2 = 0\%$, $p = 0.75$ (Fig. 6).

DISCUSSION

Since its introduction into clinical practice in the late 1960s of the last century, lateral subcutaneous sphincterotomy has proven to be an effective method of treating chronic anal fissure [4,10–16,33,34]. Until now, it was believed that the open method proposed by Parks [34] in 1967 and the closed one proposed by Notars [35] in 1969 were comparable both in terms of treatment results and the incidence of postoperative complications. This point of view is confirmed by the data of a meta-analysis conducted by Nelson [17], which shows that both methods are comparable in the incidence of fissure epithelialization and the development of anal incontinence. However, the author did not analyze the incidence of complications and the disease recurrences. In addition, a large number of non-randomized studies included in the meta-analysis cast doubt on the conclusions made about the comparability of both methods. Despite this, both techniques are equally often used in the treatment of chronic anal fissure as the 'gold standard' [4,8–11], and the choice between them is due only to the preference of the surgeon. However, it is quite obvious that each of the methods has both its advantages and disadvantages. The advantage of the closed technique is the ease and simplicity of execution, while lateral open sphincterotomy allows dissection of the internal anal sphincter under visual control. This makes it logical to assume that the open method should be more effective and be accompanied by fewer postoperative complications. However, according to a number of authors, the incidence of ASI in the postoperative period is lower in patients who underwent lateral subcutaneous closed sphincterotomy [20–22]. Having conducted a large retrospective study, which included 521 patients who underwent lateral open sphincterotomy and 343 patients who underwent lateral closed

sphincterotomy, Garcia-Aguilar [22], showed that the use of the closed technique can reduce the incidence of anal incontinence in the postoperative period. According to Gupta [18] and Kortbeek [19], the advantages of the closed technique also include a lower intensity of pain syndrome in the postoperative period, and as a consequence, a reduction in the length of stay of patients in hospital.

As a result of our work, it was found that both methods are really comparable in terms of the incidence of fissure epithelialization, complications, the disease recurrences. However, performing lateral open sphincterotomy increases the chance of developing ASI in the postoperative period by 2.05 times ($p = 0.05$).

Despite the results obtained, a significant disadvantage of lateral closed subcutaneous sphincterotomy remains the lack of visual control, which makes it necessary to further search for methods to eliminate this drawback when performing manipulation.

CONCLUSION

Both methods of lateral subcutaneous sphincterotomy are comparable to each other in terms of the incidence of the lesion epithelialization in the anal canal, complications and the disease recurrences. However, the use of closed technique is accompanied by a lower probability of developing postoperative anal sphincter incontinence.

AUTHORS CONTRIBUTION

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