

## PHARYNGEAL FLAPS VERSUS SPHINCTER PHARYNGEOPLASTY FOR VELOPHARYNGEAL INSUFFICIENCY IN CLEFT PALATE PATIENTS; META-ANALYSIS

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### ABSTRACT:

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**Background:** *Insufficient function of the velum, lateral, and posterior pharyngeal walls cause velopharyngeal insufficiency (VPI), which is defined by an inability to properly separate the oral cavity from the nasal cavity. This condition is common, especially in people with cleft palates, where 20–30% of those with or without cleft lip may develop VPI after having their palatal repair, frequently as a result of insufficient velar length. VPI is substantially more likely in those with cleft palate, a congenital disorder characterized by an inadequate roof of the mouth. There are several different causes of VPI, including as acquired deficiencies, lymphoid tissue abnormalities (such as tonsils and adenoids), and congenital malformations. A history of overt or submucous cleft palate is the main contributor to VPI. When basic physiological functions including breathing, eating, and speaking are interfered with, symptoms of VPI result. The individual's general quality of life may be impacted as a result of communication problems and diminished speech comprehension. Although clinical evaluation is also an option, the best way to determine the health of the velopharyngeal sphincter is to combine videonasopharyngoscopy (VNP) with multi-view videofluoroscopy (MMVF). In order to restore appropriate function, specifically to reestablish the seal between the nasopharynx and oropharynx during speaking, surgical intervention is essential. The two main surgical procedures used to treat VPI are sphincter pharyngoplasty and pharyngeal flap.*

**Objective:** *In order to select the best method for individuals undergoing this surgery, the study will carefully examine and document the results and potential side effects of each technique.*

**Patients and Procedures:** *The study used the procedures stated in the 2009 Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) statement to carry out this review. The PRISMA checklist and the procedures used were described elsewhere. The relevant research papers that were chosen covered information from January 2000 to January 2022. Pairwise meta-analyses of results were performed using Comprehensive Meta-Analysis software (CMA version 3.9). To assess the efficacy of pharyngeal flaps and sphincter pharyngoplasty as surgical therapies for velopharyngeal insufficiency in cleft palate patients, odds ratios (OR) and risk ratios (RR) with corresponding 95% confidence intervals (CI) were determined. Only the most recent papers were used for qualitative analysis in cases where institutions have published duplicate trials.*

**Results:** *When velopharyngeal insufficiency in patients with cleft palate was treated with sphincter pharyngoplasty, children aged 2 to*

5 years had a significantly higher double risk ratio than those who underwent pharyngeal flap surgery [Risk ratio (RR) = 2.092, 95% CI (1.266-3.457),  $p$ -value=0.004]. Because there was no heterogeneity, as shown by  $I^2=19.69$  and  $P$ -value=0.291, the fixed model was used.

**In conclusion,** pharyngeal flap surgery was statistically effective than sphincter pharyngoplasty surgery at treating velopharyngeal insufficiency in people with cleft palate. Furthermore, pharyngeal flap surgery patients showed greater statistically significant decreases in hypernasality and resonance than sphincter pharyngoplasty patients. Although nasal obstruction following pharyngeal flap surgery was less severe than after sphincter pharyngoplasty, this difference did not produce a noteworthy result. Similar to how snoring was less common after pharyngeal flap surgery than after sphincter pharyngoplasty, this difference was not statistically significant. Notably, pharyngeal flap surgeries for treating velopharyngeal insufficiency were shown to have lower rates of nasal emission and consonant correctness (12% and 13.6%, respectively).

**Keywords:** Velopharyngeal dysfunction, Velopharyngeal insufficiency, pharyngeal flap, sphincter pharyngoplasty, cleft palate.

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## INTRODUCTION:

The creation of oral speaking sounds relies heavily on the velopharyngeal valve. Three factors make up typical velopharyngeal function: anatomy, physiology, and learning. When the velopharyngeal valve fails to consistently and completely seal while producing oral sounds, velopharyngeal dysfunction (VPD) results. The causes of this dysfunction can include specific articulation problems (velopharyngeal mislearning), aberrant neurophysiology (velopharyngeal incompetence), or improper anatomy (velopharyngeal insufficiency).

When the velum, lateral, and posterior pharyngeal walls are unable to completely separate the oral cavity from the nasal cavity during speech and swallowing, this condition is known as velopharyngeal insufficiency (VPI). A short soft palate, a deep nasopharynx, hypertrophied tonsils, or a cleft palate are examples of structural anomalies that can lead to an inadequate closure of the velopharynx. Adenoidectomy can also alter the architecture. Due to insufficient velar length, 20–30% of children

with cleft palate, whether or not they also have cleft lip, may have VPI after palatal surgery. A prominent risk factor for VPI is cleft palate, a congenital disease marked by an underdeveloped mouth roof. Unusual speech patterns, such as enhanced nasal resonance and greater nasal emission, can result from the underdeveloped palate opening a space between the oral and nasal passageways<sup>(1)</sup>.

Congenital malformations, abnormalities in lymphoid tissue (tonsils and adenoids), and acquired deficiencies are a few of the causes of velopharyngeal insufficiency. A history of either an overt or submucous cleft palate is the most frequent cause of VPI. Additionally, a significant proportion of kids with cleft palate, both with and without cleft lip, might develop VPI due to insufficient velar length. VPI is also influenced by palatal fistulas, neuromuscular dysfunction, and genetic disorders including velocardiofacial syndrome<sup>(2)</sup>.

The symptoms of VPI are caused by abnormalities in vital functions like breathing, eating, and speaking. Studies have shown that people with VPI experience

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serious difficulties with speech clarity and communication, which can have a detrimental effect on their quality of life.

Patients go through a thorough evaluation to ascertain the extent and underlying cause of their VPI before having surgery. Speech analysis, physical examinations, and imaging testing could all be included in this evaluation. A multidisciplinary team composed of a skilled speech and language therapist, radiologist, otolaryngologist, and plastic surgeon with expertise in palatal and pharyngeal restoration is required for the appropriate assessment and treatment of VPI. To confirm the diagnosis of VPI, a variety of diagnostic methods including nasoendoscopy, video fluoroscopy, pressure-flow measures, and MRI are used. Although clinical diagnosis is still an option, the best diagnostic strategy combines video nasopharyngoscopy (VNP) and multi-view videofluoroscopy (MMVF)<sup>(2)</sup>.

Thankfully, people with VPI have access to a range of treatment options, including speech therapy, prosthetic limbs, and surgical procedures. The improvement of speech patterns and articulation is helped by speech therapy, and the velopharyngeal sphincter is supported by prosthetics such palatal lifts. VPI treatment options include surgical procedures; the most popular ones are pharyngeal flap and sphincter pharyngoplasty.

By constructing a circular muscle at the back of the throat, known as a sphincter, one can effectively shut off the nasopharynx when speaking. There is less chance of nasal airway blockage with this method. On the other hand, pharyngeal flap surgery involves removing tissue from the back of the throat to create a movable flap that can cover the nasopharynx when speaking. While this approach successfully resolves VPI, if the flap's thickness or location is not ideal, it can also result in nasal airway blockage<sup>(1)</sup>.

After surgery, patients go through a period of recovery and rehabilitation, which may include speech therapy and follow-up surgical appointments. The main difficulties in pharyngeal flap and sphincter pharyngoplasty procedures include the small operating room, poor visibility, problems with depth perception, and limited access for the surgeon and assistant. The degree of VPI, the surgical method used, and the patient's devotion to post-operative care and therapy all have a role in the surgery's outcome. Breathing, eating, and speaking can all be significantly impacted by VPI if it is not treated<sup>(4)</sup>.

Velopharyngeal dysfunction, which affects speech articulation and has a substantial impact on a person's quality of life, is a challenging issue. The only surefire way to restore the rinopharynx's and oropharynx's functional integrity and improve speech outcomes is through surgery. Pharyngeal flap and sphincter pharyngoplasty are two of the most frequently used surgical procedures for treating VPI. In order to guarantee surgical success and improve speech results, meticulous monitoring and thorough post-operative care are essential<sup>(3)</sup>.

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### **AIM OF THE WORK:**

The goal of the study is to evaluate and document the results and side effects of each technique in order to choose the optimal strategy for patients having this operation.

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### **METHODOLOGY:**

Methods The Preferred Reporting Items for Systematic Reviews and Meta-Analysis Statement 2009 (PRISMA) criteria were followed in the current analysis. Methodological procedures in detail, including a mention of the PRISMA checklist, were described elsewhere.

The papers chosen for this meta-analysis satisfied the following criteria: they provided data spanning from January 2000 to January 2022, focusing on the comparative assessment of surgical techniques for treating velopharyngeal insufficiency in patients with cleft palate, particularly pharyngeal flaps or sphincter pharyngoplasty. Only the most current reports that were released by institutions in cases of duplicate trials were taken into consideration for qualitative analysis. The research involved only English-speaking, human subjects, ages 2 to 5, in randomised controlled trials, cohort studies, case-control series, and reviews. The following were excluded: abstracts, case reports, conference presentations, editorials, and professional opinions.

#### **Informational Source:**

#### **Databases:**

The PRISMA checklist for systematic reviews and meta-analyses' suggested approach was followed during the study's execution. We conducted a thorough electronic search across numerous databases, including PubMed, Google Scholar, the Cochrane Database of Systematic Reviews, EMBASE, and Science Direct, even though protocol registration wasn't required.

#### **Search Strategy:**

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) were rigorously followed during the review process. The Cochrane Handbook for Systematic Reviews of Interventions' guiding principles were followed in the search process. Through extensive electronic database examination and research-related websites, studies were found. An extremely discerning electronic search approach was used to find both completed and ongoing studies. In addition to velopharyngeal insufficiency, cleft palate, nasality, palatoplasty, Furlow's operation, and soft palate, our search terms also included pharyngeal flaps and sphincter pharyngoplasty. Additionally, through

manual searches of trials in Google Scholar and by looking at the references of included papers, any potentially overlooked pertinent studies were gathered.

#### **Ethical consideration:**

The whole study design was approved by the Research Ethics Committee, Faculty of Medicine, Ain-Shams University, with approval number [FWA 000017858].

In our study, we have placed a strong emphasis on addressing potential conflicts of interest to safeguard the integrity and impartiality of our research findings recognizing the significance of transparency and credibility in scientific inquiry, we have taken proactive steps to identify and manage any potential conflicts that could influence the outcomes or interpretation of our study.

#### **Selection and data gathering procedures:**

Retrospective, prospective, cohort, observational, and interventional studies carried out between January 2010 and January 2022 were included in the study selection. The patient population was made up of non-syndromic children, 2 to 5 years old, of any gender, who had previously had cleft palate surgery (repairs could have been done using any technique or kind of cleft). The pharyngeal flap (superiorly based) and sphincter pharyngoplasty operations were the subject of the study's comparative analysis.

The extent of velopharyngeal insufficiency's remission and the efficiency of the surgical management of pharyngeal flap or sphincter pharyngoplasty were both required as outcome measures. In vitro or animal studies, untrustworthy or insufficient data, articles with only abstracts, reviews, theses, books, conference papers, case reports, case series, and articles lacking full texts were all excluded. Studies employing techniques other than pharyngeal flap surgery or sphincter pharyngoplasty, like augmentation of the posterior pharyngeal wall, were also disregarded.

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To find papers that qualified, three impartial reviewers looked at the titles and abstracts of the publications. The systematic review's inclusion of pertinent studies was ensured by further evaluation of the full-text papers. Disagreements were settled through conversation and, if necessary, consultation with a senior researcher.

The information that was gathered covered sample sizes, patient characteristics, the types of therapies used, the length of follow-up, and results.

For observational cohort studies, quality assessment involved using the NIH quality assessment tool. Based on whether each question was answered with a yes, no, or not applicable (NA), a scoring system with a range of 0 to 14 was used for cohort studies. Scores between 10 and 14 denoted high quality, 5 to 9 denoted reasonable quality, and 1-4 denoted low quality. The overall evaluation score for case series studies was 9, with scores of 7-9 denoting good quality, 4-6 denoting average quality, and 1-3 denoting subpar quality.

Utilising Comprehensive Meta-Analysis software (version 3.9), paired meta-analyses were conducted as part of the statistical analysis. For categorical data, odds ratios (OR) and risk ratios (RR) were calculated, along with matching 95% confidence intervals (CI). In the absence of heterogeneity, a fixed-effects model was used. Through Q statistics and the I<sup>2</sup>-test, heterogeneity was evaluated, with significance being considered at I<sup>2</sup> values above 50% or P-values below 0.10.

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### **RESULTS:**

### **Characteristics of literature searches and studies:**

Figure 1 shows the results of a search across electronic databases, which came up with articles. nine papers were subjected to title and abstract screening after duplicates were eliminated, and nine articles were subjected to full-text screening for possible inclusion. In total, nine publications satisfied the requirements for qualitative analysis, while four more satisfied those for quantitative meta-analysis (Figure 1). The manual search efforts turned up no new studies. Table 1 presents a thorough summary of the features of the included research.

### **Risk of bias evaluation:**

In terms of quality assessment, four studies out of nine were rated as having good quality, two as having acceptable quality, and three as having poor quality (Table 1).

### **Outcomes:**

Velopharyngeal insufficiency has not been resolved in untreated patients.

In order to treat velopharyngeal insufficiency in patients with cleft palate who are 2 to 5 years old, meta-analyses of pertinent studies revealed that patients who underwent sphincter pharyngoplasty had a significant double risk ratio compared to those who underwent pharyngeal flap surgery (Figure 2).

Fixed model with I<sup>2</sup>=19.69 and P-value=0.291 was employed because there was no heterogeneity.

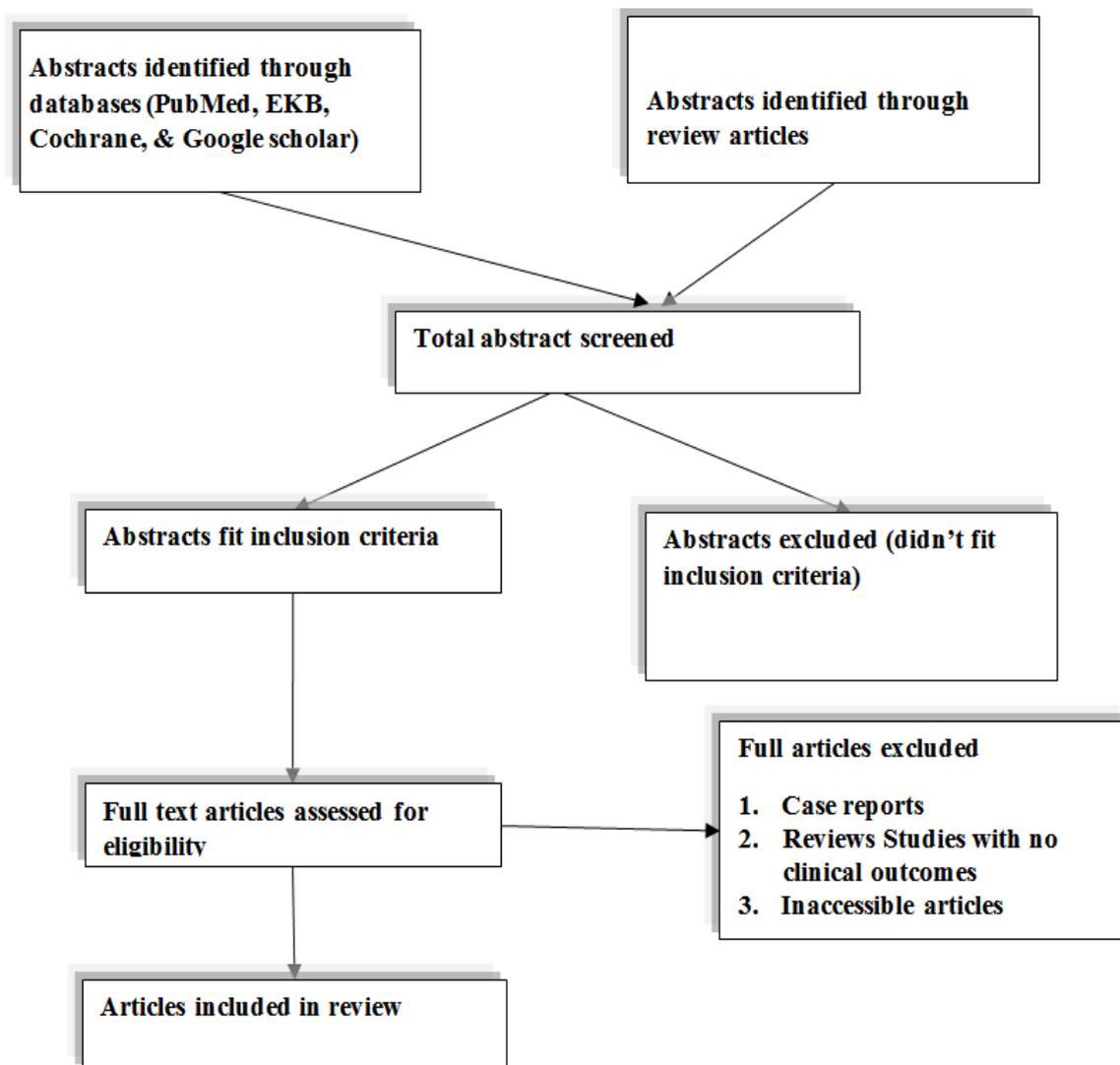
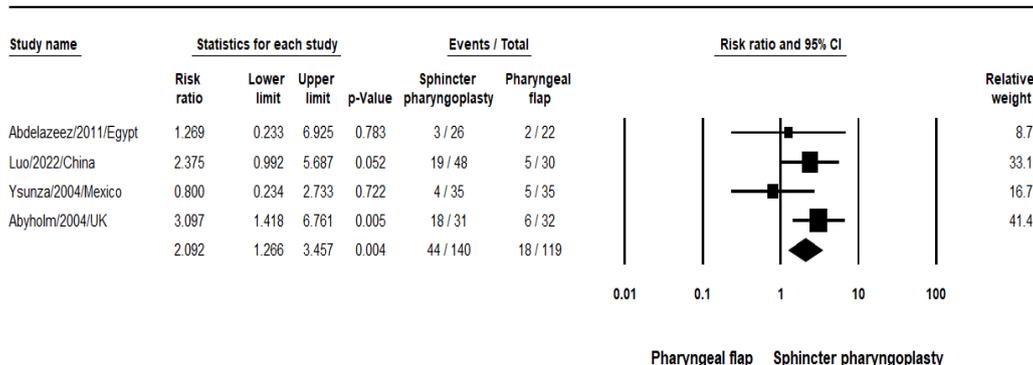


Figure (1): PRISMA flow diagram of the search and review process.

Meta Analysis for risk rate of untreated cases in treatment of velopharyngeal insufficiency



Fixed effect, I-squared= 19.69, P-value= 0.291

Figure (2): Meta-analysis for risk rate of no resolution (untreated cases) in treatment of velopharyngeal insufficiency.

## Pharyngeal Flaps VS Sphincter Pharyngoplasty

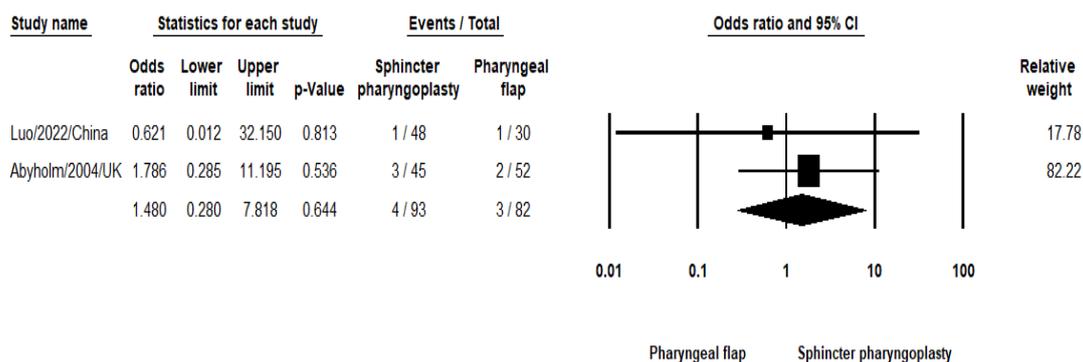
### Hypernasality (Resonance):

Meta-analyses of pertinent studies revealed that patients who underwent sphincter pharyngoplasty have insignificant susceptibility one and a half more for hypernasality/resonance who underwent pharyngeal flap in treatment of

velopharyngeal insufficiency in cleft palate 2-5 years old patients [Odds ratio (OR) = 1.480, 95% CI (0.280-7.818), p-value=0.644] (Figure 3).

Fixed model was used due to absence of heterogeneity with  $I^2 < 0$  and P-value=0.634.

### Meta Analysis for hypernasality/resonance in treatment of velopharyngeal insufficiency



Fixed effect, I-squared= 0, P-value= 0.634

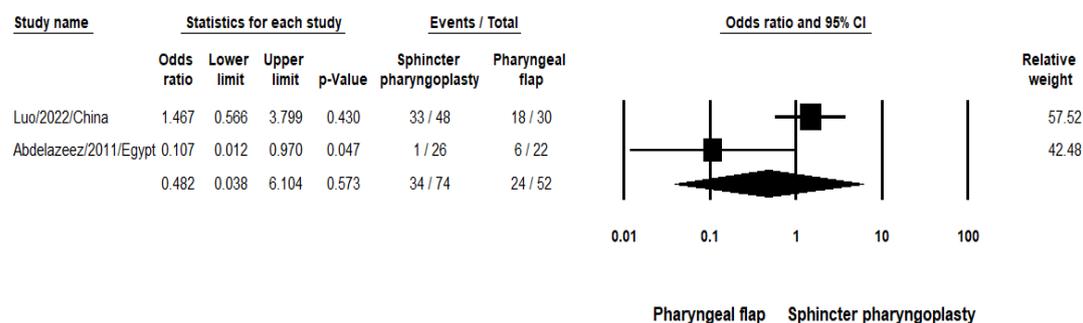
**Figure (3):** Meta-analysis for hypernasality/resonance association in treatment of velopharyngeal insufficiency

### Snoring incidence

Meta-analyses of pertinent studies revealed a non-significantly higher incidence of snoring in patients who underwent pharyngeal flap surgery compared to those

who underwent sphincter pharyngoplasty for the treatment of velopharyngeal insufficiency in cleft palate patients aged 2 to 5 (OR = 0.482, 95% CI (0.038-6.104), p-value=0.573; Figure 4).

### Meta Analysis for snoring incidence in treatment of velopharyngeal insufficiency



Random effect, I-squared= 78.09, P-value= 0.033

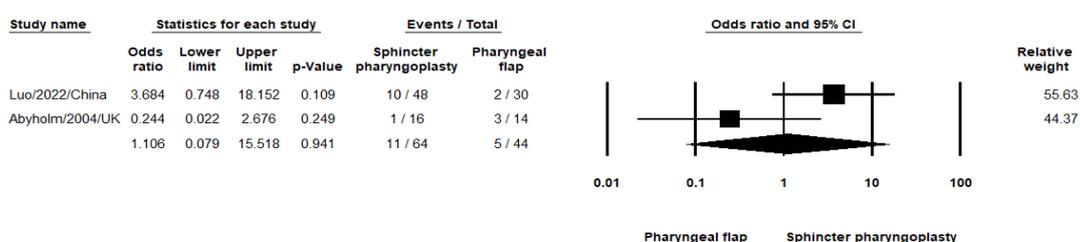
**Figure (4):** Meta-analysis for snoring incidence in treatment of velopharyngeal insufficiency.

**Nasal obstruction:**

Meta-analyses of pertinent studies revealed that patients who underwent sphincter pharyngoplasty had a negligible increased risk of nasal obstruction compared

to those who underwent pharyngeal flap surgery to treat velopharyngeal insufficiency in cleft palate patients between the ages of 2 and 5 (OR = 1.106, 95% CI (0.079-15.518), p-value=0.941; Figure 5).

**Meta Analysis for nasal obstruction in treatment of velopharyngeal insufficiency**



Random effect, I-squared= 70.74, P-value= 0.064

**Figure (5):** Meta-analysis for nasal obstruction association in treatment of velopharyngeal insufficiency.

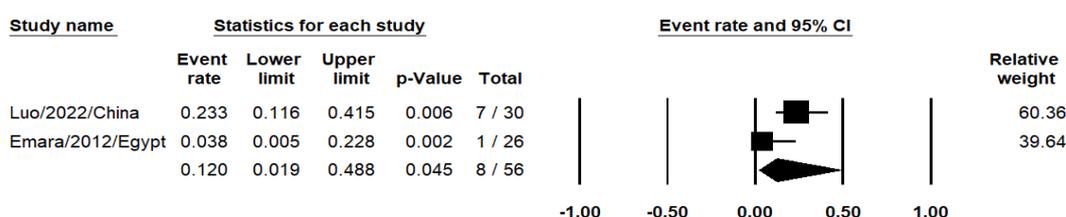
**Nasal emission:**

Meta-analyses of relevant studies showed that patients underwent pharyngeal flap have 12% susceptibility for nasal emission who underwent in treatment of velopharyngeal insufficiency in cleft palate

2–5 years old patients [Event rate = 0.120, 95% CI (0.019–0.488), p-value=0.045] (Figure 6).

Random model was used due to presence of heterogeneity with I<sup>2</sup>=70.22 and P-value=0.067.

**Meta Analysis for nasal emission using pharyngeal flap in treatment of velopharyngeal insufficiency**



Random effect, I-squared= 70.22, P-value= 0.067

**Figure (6):** Meta-analysis for nasal emission association using pharyngeal flap in treatment of velopharyngeal insufficiency.

**Consonant accuracy:**

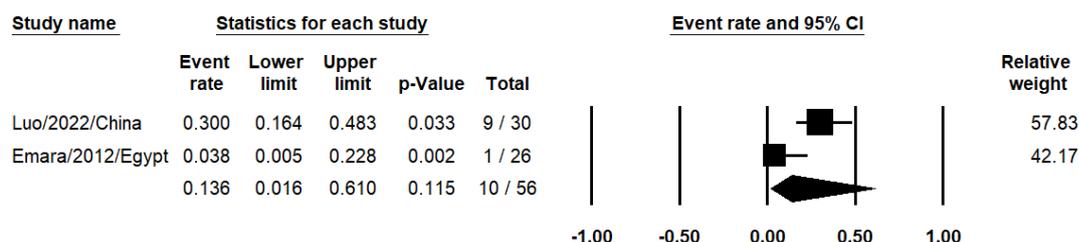
According to meta-analyses of pertinent research, patients who received pharyngeal flap surgery as a treatment for velopharyngeal insufficiency in cleft palate patients aged 2 to 5 have a 13.6%

susceptibility for consonant accuracy [Event rate = 0.136, 95% CI (0.016-0.610), p-value=0.115] (Figure 7).

Due to the presence of heterogeneity, with an I<sup>2</sup> of 78.68 and a P-value of 0.030, a random model was chosen.

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Meta Analysis for consonant accuracy using pharyngeal flap in treatment of velopharyngeal insufficiency



Random effect, I-squared= 78.68, P-value= 0.030

**Figure (7):** Meta-analysis for consonant accuracy using pharyngeal flap in treatment of velopharyngeal insufficiency.

**Table (1):** Characteristics table for included studies.

Reference ID	Type of Study	Sample size	Type of procedure	Sex Female/male	Follow-up period	QA tool
Abyholm/2005/UK	Prospective	97	SP = 45 PF = 52	M = 23 / F = 22 M = 34 / F = 18	12 months	Good
Abdel-Aziz/2011/Egypt	Retrospective	48	SP = 26 PF = 22	M = 27 / F = 21	2006-2008	Good
Emara/2012/Egypt	Prospective	26	PF = 26	M = 16 / F = 10	1-6 months	Good
Gart/2014/USA	Review	NA	NA	NA	NA	Poor
Horton/2014/USA	Retrospective	446	SP = 196 PF = 250	M = 105 / F = 91 M = 130 / F = 120	2014-2015	Fair
Lee/2015/USA	Review	NA	NA	NA	NA	Poor
Luo/2020/China	Retrospective	78	SP = 48 PF = 30	M = 24 / F = 18 M = 17 / F = 13	2009-2011	Good
Naran/2017/USA	Review	NA	NA	NA	NA	Poor
Ysunza/2004/Mexico	Prospective	70	SP = 35 PF = 35	NA	NA	Fair

SP = Sphincter pharyngoplasty, PF = Pharyngeal flap

### DISCUSSION:

To compare the efficacy of the two common surgical procedures, pharyngeal flap and sphincter pharyngoplasty, for treating velopharyngeal insufficiency, we did a systematic review and meta-analysis. After conducting a thorough literature search, we narrowed down our selection by removing papers that didn't fit our criteria, which led us to include four papers (4-7) containing data from 259 patients for a pooled and analysed assessment. Despite the

few investigations, a fixed effect model was used because the data were coherent.

Our analysis of the four articles (4-7) demonstrated that patients who underwent the sphincter pharyngoplasty procedure faced twice the risk of non-resolution of velopharyngeal insufficiency after cleft palate surgery (RR = 2.092) compared to those who underwent the pharyngeal flap procedure. Notably, this finding had a high level of statistical significance (p-value = 0.004), clearly demonstrating the greater

effectiveness of the pharyngeal flap technique over sphincter pharyngoplasty in addressing velopharyngeal insufficiency in individuals with cleft palate.

According to *Abyholm et al.* (4)'s international multi-center randomised controlled trial, there was no statistically significant difference in postoperative hypernasal resonance and nasalance scores between the two operations at the 12-month mark. At three months following surgery, a statistically significant difference between the two groups did, however, appear, favouring the pharyngeal flap group in terms of lowering hypernasal resonance and nasalance ratings. Both groups showed equivalent results during nasoendoscopy.

Studies comparing sleep patterns revealed no statistically significant changes between the two methods. Both the complication and reoperation rates were low and didn't show any notable variations amongst the techniques. While hospital stays ranged from one to seven days and surgery times from 60 to 90 minutes, similar values were seen in both groups.

According to *Ysunza et al.* (7), there was no statistically significant difference between the two patient groups' preoperative mean velopharyngeal closure gap sizes (mean = 27.5%; standard deviation (SD) = 7.7% versus mean = 28.3%; SD = 5.9%) for the 70 patients who were randomly assigned to one of two groups. Following surgery, velopharyngeal insufficiency was fully resolved in 89% of instances treated with pharyngeal flap surgery and 85% of cases treated with sphincter pharyngoplasty. The success rate for treating velopharyngeal insufficiency in both patient groups did not differ significantly.

The sphincter pharyngoplasty group had a non-statistically significant greater percentage of velopharyngeal insufficiency resolution (50%) than the pharyngeal flap

group (22%), according to *De Serres et al.* (8), who compared the two groups.

According to *Pensler et al.* (9), the improvement in velopharyngeal insufficiency as measured by speech was almost equal in both groups.

*Williams and Woolhouse* (10) found that pharyngeal flaps had an improvement rate of 83% for velopharyngeal insufficiency while sphincter pharyngoplasty had a 67% improvement rate.

According to *Luo et al.* (6), a posterior pharyngeal flap is a more effective method than sphincter pharyngoplasty for addressing velopharyngeal insufficiency following cleft palate surgery and involves no postoperative problems. Because it had a lower incidence of postoperative snoring than pharyngeal flap, it was discovered that the circular closure pattern of the sphincter pharyngoplasty is the preferred treatment.

According to *Horton et al.* (11), the surgeon's convenience came top, followed by patient and anatomical variables. Sphincter pharyngoplasty is the treatment of choice in cases when all other variables are equal since it is less expensive than pharyngeal flap surgery. Even the pharyngeal flap was discovered to be a better method in this meta-analysis for treating velopharyngeal insufficiency in patients with cleft palate with lower rates of complications. It is crucial to remember that additional research is necessary before considering these findings as conclusive. To achieve high accuracy in their outcomes, future randomised controlled trials (RCTs) that address this issue should be careful in their methods.

### **Conclusion:**

In the treatment of velopharyngeal insufficiency in patients with cleft palate, the pharyngeal flap technique was statistically effective than the sphincter pharyngoplasty procedure. Additionally, resonance and hypernasality decreased statistically more in

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the pharyngeal flap group than in the sphincter pharyngoplasty group. There was no discernible difference in nasal obstruction between the pharyngeal flap and sphincter pharyngoplasty procedures. However, there was no discernible difference between pharyngoplasty and pharyngeal flap in terms of snoring occurrence. Low rates of nasal emission and consonant accuracy were observed during pharyngeal flap surgeries for velopharyngeal insufficiency (12 and 13.6%, respectively).

### **conflict of interest and funding:**

The authors declare that there was no conflict of interest.

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## علاج إرتجاع الصمام الحلقى البلعومي لمرضى شق سقف الحلق إما باستخدام السدائل البلعومية أو إصلاح الصمام: مراجعة منهجية

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**الخلفية:** تسبب الوظائف غير الكافية للحنك، والجدران الجانبية، والجدار الحلقى الخلفي في العجز في الحلق والحنك، والذي يعرف بعدم القدرة على فصل الفم عن التجويف الأنفي بشكل صحيح. هذا الحالة شائعة، خصوصاً في حالة الأشخاص الذين يعانون من فتق في الحنك، حيث يمكن أن يطور 20-30% من الأشخاص الذين يعانون من فتق في الحنك أو بدون فتق شفوي عدم كفاية في الحلق والحنك بعد عملية إصلاح الحلق، غالباً نتيجة لقص الحنك. ويكون العجز في الحلق والحنك أكثر احتمالاً بشكل كبير في حالة الفتق في الحنك، وهو اضطراب خلقي يتسم بانخفاض في سقف الفم. هناك أسباب مختلفة للعجز في الحلق والحنك، بما في ذلك النقص المكتسب، والشوائب في أنسجة الليمفاوية (مثل اللوزتين واللوزتين اللويحيتين)، والتشوهات الخلقية. تعد تاريخ وجود فتق في الحنك المفتوح أو الخفي هو المساهم الرئيسي في العجز في الحلق والحنك. عندما تتداخل وظائف الأعضاء الفيزيولوجية الأساسية مثل التنفس والأكل والتحدث، تظهر أعراض العجز في الحلق والحنك. يمكن أن تتأثر الجودة العامة للحياة للفرد نتيجة لمشكلات التواصل وتدني فهم الكلام. على الرغم من أن التقييم السريري أيضاً خيار آخر، إلا أن أفضل طريقة لتقدير صحة العضلة الحلقية الحنكية هي دمج التنظير الأنفي الحلقى بالفيديو (VNP) مع التنظير متعدد العروض بالفيديو (MMVF). لاستعادة الوظيفة المناسبة، وتحديد إعادة إنشاء الإحكام بين التجويف الأنفي والفموي أثناء الكلام، يتعين اللجوء إلى التدخل الجراحي. الإجراءات الجراحية الرئيسيتين المستخدمة لعلاج العجز في الحلق والحنك هما جراحة الفلاب الحلقى وجراحة الشريان الحلقى.

**الهدف:** من هذه الدراسة هو تقييم ومقارنة فعالية جراحة الفلاب الحلقى مقابل جراحة الشريان الحلقى كإجراءات جراحية لعلاج العجز في الحلق والحنك لدى مرضى الفتق في الحنك. من أجل اختيار أفضل الطرق للأفراد الذين يخضعون لهذا النوع من الجراحة، ستقوم الدراسة بفحص ووثق نتائج وأثار الجراحة الجانبية المحتملة لكل تقنية بعناية.

**المرضى والإجراءات:** استخدمت الدراسة الإجراءات المذكورة في بيان تقرير البنود المفضلة للمراجعات النظامية والتحليل النمائي المتعدد (PRISMA) لعام 2009 لإجراء هذا الاستعراض. تم وصف قائمة التحقق PRISMA والإجراءات المستخدمة في مكان آخر. تغطي الأوراق البحثية ذات الصلة التي تم اختيارها معلومات من يناير 2010 حتى يناير 2022. تم إجراء تحليلات متزامنة للنتائج باستخدام برنامج التحليل الشامل (CMA الإصدار 3.9). تم تحديد معدلات الاحتمال (OR) ومعدلات الخطر (RR) مع فترات ثقة بنسبة 95% (CI) المقابلة لتقييم فعالية جراحة الفلاب الحلقى وجراحة الشريان الحلقى كعلاج للعجز في الحلق والحنك لدى مرضى الفتق في الحنك. تم استخدام أحدث الأوراق البحثية فقط للتحليل النوعي في الحالات التي نشرت المؤسسات تجارب متكررة.

**النتائج:** عندما تم علاج العجز في الحلق والحنك لدى مرضى الفتق في الحنك باستخدام جراحة الشريان الحلقى، كان لدى الأطفال الذين تتراوح أعمارهم بين 2 و 5 سنوات معدل خطر مضاعف أعلى بشكل كبير ممن خضعوا لجراحة الفلاب الحلقى [معدل الخطر (RR) = 2.092، (95% CI) 1.266-3.457]، قيمة  $p = 0.004$ . بسبب عدم وجود تباين، كما أظهره  $I^2 = 19.69$  والقيمة  $p = 0.291$ ، تم استخدام النموذج الثابت.

**الخاتمة:** كانت جراحة الفلاب الحلقى أكثر فعالية إحصائياً من جراحة الشريان الحلقى في علاج العجز في الحلق والحنك لدى الأشخاص الذين يعانون من فتق في الحنك. علاوة على ذلك، أظهر مرضى جراحة الفلاب الحلقى انخفاضات إحصائية أكبر في نسبة الحدة الزائدة والاهتزاز مقارنة بمرضى جراحة الشريان الحلقى. على الرغم من أن انسداد الأنف بعد جراحة الفلاب الحلقى كان أقل خطورة من بعد جراحة الشريان الحلقى، إلا أن هذا الفرق لم يؤدي إلى نتيجة ملحوظة. بالمثل، كانت الشخير أقل شيوعاً بعد جراحة الفلاب الحلقى مقارنة بجراحة الشريان الحلقى، ولكن هذا الفرق لم يكن ذا أهمية إحصائية. يُظهر الدراسة أيضاً أن جراحة الفلاب الحلقى لعلاج العجز في الحلق والحنك كانت لها معدلات أقل للانبثاق الأنفي وصحة الحروف (12% و 13.6% على التوالي).