

Functional and Psychological Outcomes of Nasal surgery in Patients under 18 Years of Age: A Systematic Review



Jaime Ramirez¹, Daniel Rangel², Ana María Sandoval³, Sebastian Palma⁴, Carolina Hernández⁵

¹Santa Fe de Bogota Foundation, Department of Otolaryngology Otolaryngology and Facial Plastic Surgery, Colombia

²Santa Fe de Bogota Foundation, Subdivision of Clinical Studies. Research Assistant, MD, Colombia

³Clinica Shaio, Emergency Department, MD, Colombia

⁴El Bosque University, Department of Pediatrics Institutional Resident, MD, Colombia

⁵National University Hospital, Department of Otolaryngology Institutional Resident, MD, Colombia

Submission: October 24, 2024; **Published:** November 12, 2024

***Corresponding author:** Jaime Ramirez, Department of Otolaryngology-Head & Neck Surgery Santa Fe de Bogota Foundation, Colombia

Abstract

Introduction: Controversy exists over the optimal age for pediatric nasal surgery due to potential impacts on nasal growth.

Objective: Evaluate functional and quality-of-life outcomes following pediatric nasal surgery.

Methodology: Systematic review of published studies reporting validated functional or QOL outcomes among pediatric nasal surgery patients under 18 years of age, excluding surgery for craniofacial abnormalities.

Results: 7 studies were evaluated, including 437 patients with an average age of 14.8 years (range 4-18). Improvements were observed via the Nasal Obstruction Symptom Evaluation (NOSE) score, with significant reductions post-surgery in both functional septorhinoplasty (FSR) ($z = -7.9, p < 0.001$) and septoplasty ($z = -5.9, p < 0.001$). The QOL measurements also improved as measured by the Glasgow Children's Benefit Inventory (GCBI) score ($t = 6.1, p < 0.001$). VAS EQ5D and Sinus and Nasal Quality of Life Survey (SN-5) improved (5.0 [4.0, 6.3] to 8.0 [8.0, 10.0], $p < 0.001$; 3.5 [2.8, 4.3] to 2.0 [1.4, 2.8], $p < 0.001$) respectively.

Conclusion: Septoplasty and septorhinoplasty improve functional outcomes and QOL in pediatric patients.

Keywords: Nasal surgical procedures; Adolescent; Children; Nasal diseases; Nasal obstruction; Psychological adaptation

Introduction

There is no consensus on the appropriate age to perform functional or aesthetic nasal surgery in young patients. Despite the frequent performance of septoplasty and septorhinoplasty, the outcomes of these surgeries in young patients remain unclear, even though there has been an increase in such procedures among these age groups in recent years [1]. As of 2019, a total of 1,777 nasal surgeries have been reported in children under 18 years of age, thus being the fourth most frequent cosmetic surgery in this age group [2]. Traditionally, congenital or acquired pathologies associated with severe obstruction have been used as indications for surgical correction. Other indications have been the presence of malignant tumors, dermoid cysts, or complications derived from acute trauma, hematoma, or septal abscess [3].

When there are no absolute indications, the usual practice has been to wait until the patient reaches at least 14 years of age in women and 16 years of age in men to avoid impact on growth [4]. Several authors have evidenced the functional and life quality improvement associated with nasal surgery and the low risk of impact on facial growth in the pediatric population [5-10]. Likewise, with adequate indication, nasal surgery can avoid not only deformities but also negative functional and psychosocial effects [11]. The purpose of this research is to perform a systematic review of studies evaluating validated functional or QOL outcomes in children and adolescents undergoing functional nasal surgery.

Methodology

A systematic review study was performed. This involved a search for studies between 01-01-2000 to 01-01-2024 evaluating

functional or quality of life outcomes following nasal surgery among pediatric patients less than 18 years old. The search was limited to the last 24 years to ensure that the included studies were both relevant and representative of recent evidence. The timeframe was chosen because it aligns with the period during which nasal surgery has become increasingly prominent and advanced in the field of surgery.

The inclusion criteria for the systematic review encompassed studies with observational design characteristics, including cohort, cross-sectional, cases-controls studies, analytical designs such as randomized controlled trials, quasi-experimental studies, and other systematic reviews. Studies were selected if they were published in Spanish, English, Portuguese, French or German and on a target population of patients aged 1 to 18 years. Patients with a history of cleft palate or facial malformation were excluded, as well as non-clinical studies, letters to the editor, and expert opinions.

Data for the systematic review were extracted from primary studies published in the following databases: PubMed, ClinicalKey, TRIP, ScienceDirect, and Embase, using PICO question and keywords set in MESH terms: Nasal Surgical Procedures, Adolescent, Child, Nose diseases, Nasal Obstruction, Psychological Adaptation [Annex 1,2]. MESH definitions categorized nasal surgical procedures to encompass operations on the nose and nasal cavity, which includes septoplasty and functional septorhinoplasty. The primary outcome was the measurement of a validated nasal outcome measure, with the secondary outcome

of a standardized measure of quality-of-life or psychological function [Annex 3]. This research protocol was approved by the ethics committee of the Santa Fe de Bogota Foundation.

Prospero Register: CRD42021248058

Data from search and selected articles were obtained independently by two reviewers using a predefined extraction. The COVIDENCE tool based on the PRISMA statement was used for systematic reviews. The bias assessment of each study was performed using the Robins 1 tool, classifying it as: “low risk”, “high risk” or “unclear risk” [12]. Each phase was performed by two reviewers independently and any disagreement was resolved by a third reviewer. The methodological quality of this review was assessed using the GRADE scale [13].

Results

In the initial search across various databases using selected MESH terms, we identified 832 studies. After removing 68 duplicates, we were left with 763 studies. Based on the abstracts of each study, 735 articles did not meet the inclusion criteria. Thus, the full-texts versions of 26 articles were evaluated for eligibility. Of these, 7 studies had interventions that did not align with the objective of this review, 5 did not involve the target population, 4 lacked defined objective results, 2 included an adult population, and 1 did not meet the study design included in our review (Figure 1). Therefore, a total of 7 studies were included in the analysis of this systematic review (Table 1).

Table 1: Studies included in the analysis.

Authors	Year	Type of Study	Type of surgery	Number of participants	Age range of patients	Outcome measurements	Follow-up time
K, Anderson; et al.	2016	Retrospective cohort study	septoplasty surgery	29. (13 F - 16 M)	5-16 years (11.2 years)	Glasgow Children's Benefit Inventory (GCBI) - Paediatric Quality of Life Inventory (PedsQL)	2 years
Manteghi, Alexander; et al.	2018	Prospective cohort study	Septoplasty and functional septorhinoplasty (FSR)	136. (42 F - 94 M) 52 Septoplasty (10 F - 42 M) 84 Septorhinoplasty (32 F - 52 M)	12 - 18 years	Nasal Obstruction Symptom Evaluation (NOSE)	1 month - 2.7 years
Fuller, Jennifer; et al.	2018	Retrospective cohort study	Functional Septorhinoplasty	39. (20 F - 19 M)	7-18 years	Nasal Obstruction Symptom Evaluation (NOSE), EuroQol 5-Dimension Health Assessment (EQ5D), peak nasal inspiratory flow (PNIF)	2-24 months
V.S, Lee; et al.	2016	Retrospective cohort study	Septoplasty	28. (9F - 19 M)	13-20 years	Sinus and Nasal Quality of Life Survey (SN-5)	44 days
Kawai et al	2021	Prospective cohort study	septoplasty and bilateral inferior turbinate reduction surgery	38	11-20 years	Nasal Obstruction Symptom Evaluation (NOSE)	2 months
Yilmaz	2014	Prospective cohort study	Septoplasty	35(11F-24M)	13,4 ± 2,8 years	Nasal Obstruction Symptom Evaluation (NOSE)	1 year
Din, H. et., al.	2020	Prospective cohort study	Septoplasty and functional septorhinoplasty	132 (42F - 94M)	15.7 ± 2.1 years	Nasal Obstruction Symptom Evaluation (NOSE)	1 - 32.4 months

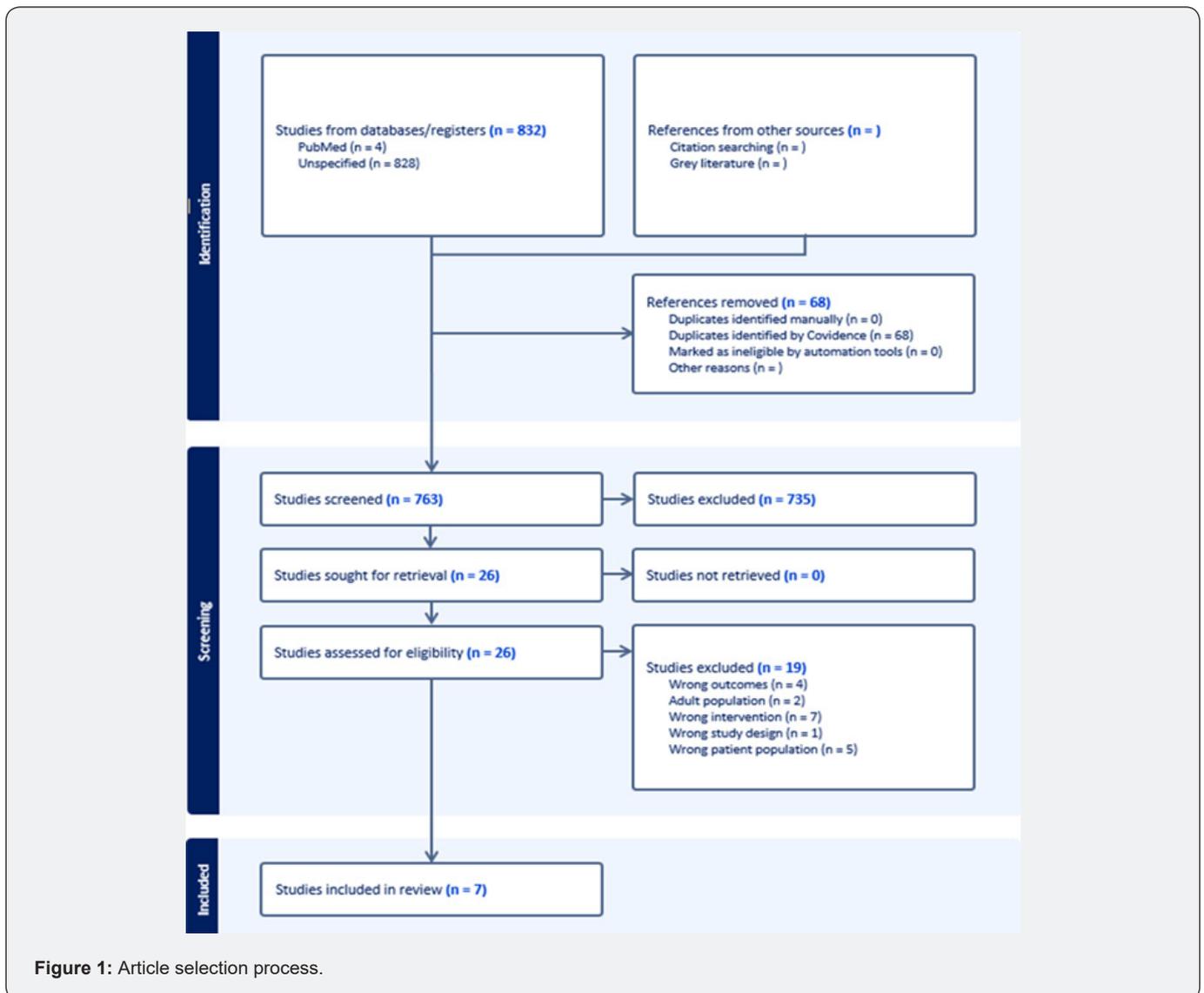


Figure 1: Article selection process.

Characterization of the study population

Altogether, the 7 studies included a total of 437 participants, with a sex distribution of 65% men and 35% women. The average age of the participants was 14.80 years, with an age range from 4 to 18. The scales used to evaluate the outcomes related to improvement in terms of quality of life were NOSE, Glasgow Children’s Benefit Inventory (GCBI), Paediatric Quality of Life Inventory (PedsQL), EuroQol 5-Dimension Health Assessment (EQ5D), Sinus and Nasal quality-of-life survey (SN-5) and the Visual Analogue Scale (VAS) [14 -17]. In our systematic review, the study titled “Improvement in Quality of Life after Septoplasty in Children: A Systematic Review” was excluded because, when subjected to the “AMSTAR-2” critical appraisal tool for systematic reviews of health intervention studies, it was determined to have critically low confidence in its results.

AMSTAR-2 is a robust tool for assessing the methodological quality of systematic reviews, and a low rating in this evaluation indicates significant problems in the study’s design, execution, and reporting. These problems may include biases in study selection, lack of rigor in evaluating the quality of included evidence, and deficiencies in synthesizing the results. Including a study with such methodological deficiencies could compromise the integrity and validity of our conclusions, potentially leading to erroneous or unfounded conclusions. Therefore, to ensure the robustness and reliability of our systematic review, we decided not to include this review [18].

In the study by K. Anderson, et al. which focused on septoplasty in patients aged 16 years or younger, the authors evaluated health-related quality of life (HRQoL) outcomes using the Glasgow Children’s Benefit Inventory (GCBI) and Paediatric Quality of Life

Inventory (PedsQL) tools and found that there was a statistically significant improvement in HRQoL following septoplasty, mostly in the physical subscore (The mean total GCBI score ($t = 6.1$, $P < 0.001$) and all subscore (emotion subscore: $t = 5.2$, $P < 0.001$; physical subscore: $t = 6.8$, $P < 0.001$; learning subscore: $t = 6.8$, $P < 0.001$; vitality subscore: $t = 4.9$, $P < 0.001$)). In addition, patients who had a greater degree of nasal obstruction experienced greater benefit from undergoing the septoplasty procedure. Overall, the authors recommended including the pediatric patients in the decision-making process to achieve better results. Likewise, they found that patients who wanted surgery had a greater increase in HRQoL compared to those who did not want to undergo it, concluding that the opinion of the patient should be included whenever possible when making the decision to perform or not perform the procedure [14].

In the study conducted by Manteghi, et al. which focused on septoplasty and functional septorhinoplasty among patients aged 18 years or younger, the authors evaluated pre- and post-operative quality-of-life (QOL) outcomes using Nasal Obstruction Symptom Evaluation (NOSE) tool. Their results showed a statistically significant decrease in NOSE scores between pre- to post-operative stages in both surgeries (FSR: ($z = -7.9$, $p < 0.001$) and septoplasty: ($z = -5.9$, $p < 0.001$)). However, a greater median change in FSR ($U = 1521$, $Z = -2.4$, $p = 0.02$) was observed. Additionally, the authors were not able to reach conclusions regarding patients younger than 13 years of age due to the lack of patients [15].

In the study by Fuller, J., et al. involving patients aged 18 years or younger who underwent functional septorhinoplasty, the authors evaluated disease-specific quality of life, global health related quality of life (HRQoL) and an objective measure of nasal airflow, using the Nasal Obstruction Symptom Evaluation (NOSE) scale, the EuroQol 5-Dimension Health Assessment (EQ5D), and peak nasal inspiratory flow (PNIF) tools. They found that NOSE scores significantly decreased in the post-operative ($p < 0.001$), EQ5D VAS score was significantly higher compared to the baseline score ($p = 0.056$). Further, the PNIF score was clinically and significantly better post-operatively ($p = 0.006$). The authors found no sex-based differences [19].

In the study by V.S. Lee, et al. on pediatric patients undergoing septoplasty, the authors evaluated sinus and nasal-specific quality-of-life using the Sinus and Nasal Quality of Life Survey (SN-5) tool and found that the SN-5 and VAS scores were significantly improved from pre- and post-septoplasty ((3.5 [2.8, 4.3] to 2.0 [1.4, 2.8], $p < .001$) and (5.0 [4.0, 6.3] to 8.0 [8.0, 10.0], $p < .001$), respectively). They also found that overall score improvement was greater in females compared to males (-1.8 [-2.6, -1.6] vs -1.0 [-1.6, -0.2], $p = .01$). However, there were not statistically significant differences by age or surgical approach [20].

In the study by Kawai et al is evaluated the NOSE scale for

pediatric nasal obstruction. Includes patients with mean age of 15.4 years: Patients who underwent septoplasty and bilateral inferior turbinate reduction and random sample of patients with non-rhinologic complaints who did not undergo surgery.

Among the patients who underwent septoplasty and turbinate reduction, mean NOSE scores declined significantly from 96.7 (SD 6.2) during the preoperative period to 8.8 (SD 7.8) during their post-operative evaluation (mean difference = -87.9 ; 95% CI: -84.5 , -91.3 ; $P < .001$). Similar improvements were observed across age groups. Most patients reported no symptom or very mild symptoms of nasal obstruction symptoms septoplasty in combination with turbinate reduction. They found that the NOSE instrument has adequate test-retest reliability and internal consistency reliability. Internal consistency reliability using Omega and maximal reliability H was well above recommended standards [21].

In the study by Din a cohort of 136 pediatric patients between the ages of 8 and 18 years (15.7 ± 2.1) who underwent septoplasty or functional septorhinoplasty from January 2013 to January 2017 was evaluated. The authors used the NOSE scale preoperatively and postoperatively, with a mean follow-up time of 3.6 ± 5.1 months (1 month-2.7 years). Most participants reported a change in NOSE scores pre- to postintervention, indicating an improvement in nasal obstruction with a significant statistically difference in scores pre surgery (median = 75) to post surgery (median = 20) ($Z = 11$, $P < .001$) [22].

In the study by Yilmaz evaluated patients aged 16 years or younger who underwent functional septoplasty, the authors evaluated using the Nasal Obstruction Symptom Evaluation (NOSE) scale. The average NOSE scores at the beginning, and 3- and 12-months post-surgery were 71.0 ± 18.9 , 22.6 ± 19.7 , and 23.7 ± 22.8 , respectively. There was an improvement in the NOSE score at 3 months following septoplasty. The difference between the scores before and after the operation was highly significant ($p < 0.001$). In 14 patients, the NOSE score reached the value of 0, while 12 patients reported a maximum subjective satisfaction of 10 on the visual analogue scale (VAS) at the last follow-up [23].

Biases included in studies

The following domains were evaluated in the 7 included studies: confounding bias, patient selection bias, intervention classification selection, incomplete data bias, treatment deviation bias, outcome measurement bias, and bias in the selection of reported results. The studies generally demonstrated a low risk of bias across most domains. However, moderate to high risk of bias were observed in the domains concerning missing data and outcome measurement (Figures 2 & 3). The domain of bias assessment for outcome measurement was the most affected, stemming from the various tools used to evaluate the functional involvement.

Annex 1: Search table on anatomical and functional implications.

	English	Trip	Mesh pubmed	Pubmed	Mesh clinical key	Clinical key	Mesh science direct	Science direct	Mesh embase	Embase
P	Adolescent Child	623	Nasal Surgical Procedures AND Adolescent AND Nose diseases AND Nasal Obstruction	387	Nasal Surgical Procedures AND Adolescent AND Nose diseases AND Nasal Obstruction	217	Nasal Surgical Procedures AND Adolescent AND Nose diseases AND Nasal Obstruction	1396	('nasal surgical procedures'/exp OR 'nasal surgical procedures' OR (nasal AND surgical AND ('procedures'/exp OR procedures))) AND ('adolescent'/exp OR adolescent) AND ('nose diseases'/exp OR 'nose diseases' OR (('nose'/exp OR nose) AND ('diseases'/exp OR diseases))) AND ('nasal obstruction'/exp OR 'nasal obstruction' OR (nasal AND ('obstruction'/exp OR obstruction)))	998
I	Nasal Surgical Procedures									
C	Before and after surgical procedure									
O	Nose diseases									
	URL	https://www.tripdatabase.com/search?criteria=Nasal+Surgical+Procedures+AND+Adolescent+AND+Nose+diseases+AND+Nasal+Obstruction	https://pubmed.ncbi.nlm.nih.gov/ezproxy.uniandes.edu.co:8443/?term=Nasal+Surgical+Procedures+AND+Adolescent+AND+Nose+diseases+AND+Nasal+Obstruction	https://www.clinicalkey-es.ezproxy.uniandes.edu.co:8443/#!/search/Nasal%2520Surgical%2520Procedures%2520AND%2520Adolescent%2520AND%2520Nose%2520diseases%2520AND%2520Nasal%2520Obstruction	https://www.science-direct-com.ezproxy.uniandes.edu.co:8443/search?q=Nasal%20Surgical%20Procedures%20AND%20Adolescent%20AND%20Nose%20diseases%20AND%20Nasal%20Obstruction	https://www.embase-com.ezproxy.unbosque.edu.co/#advancedSearchresultspagehistory.1/page.1/25/items/order/date/source				
Last Updated		02/29/2024		02/26/2024		02/03/2024		02/03/2024		25/03/2024

Annex 2: Search table on psychological implications.

	English	Mesh Trip	Trip	Mesh Pubmed	Pubmed	Mesh Clinical Key	Clinical Key	Mesh Science Direct	Science Direct	Mesh Embase	Embase
P	Adolescent, Child	Nasal Surgical Procedures AND Adolescent AND Adaptation Psychological	233	Nasal Surgical Procedures AND Adolescent AND Adaptation Psychological	3	Nasal Surgical Procedures AND Adolescent AND Adaptation Psychological	54	Nasal Surgical Procedures AND Adolescent AND Adaptation Psychological	567	('nasal surgical procedures'/exp OR 'nasal surgical procedures' OR (nasal AND surgical AND ('procedures'/exp OR procedures))) AND ('adolescent'/exp OR adolescent) AND ('adaptation psychological'/exp OR 'adaptation psychological' OR (('adaptation'/exp OR adaptation) AND psychological))	1
I	Nasal Surgical Procedures										
C	Before and after surgical procedure										
O	Adaptation Psychological										

			https://www.tripdatabase.com/search?criteria=Nasal+Surgical+Procedures+AND+Adolescent+AND+Adaptation+Psychological	https://pubmed.ncbi.nlm.nih.gov/ezproxy.uniandes.edu.co:8443/?term=Nasal+Surgical+Procedures+AND+Adolescent+AND+Adaptation+Psychological	https://www-clinicalkey-es.ezproxy.uniandes.edu.co:8443/#!/search/Nasal%20Surgical%20Procedures%20AND%20Adolescent%20AND%20Adaptation%20Psychological	https://www-science-direct-com.ezproxy.uniandes.edu.co:8443/search?q=Nasal%20Surgical%20Procedures%20AND%20Adolescent%20AND%20Adaptation%20Psychological	https://www-embase-com.ezproxy.unbosque.edu.co/#advancedSearch/resultspage/history.5/page.1/25.items/orderby.date/source
Last Updated			02/29/2024	02/26/2024	02/03/2024	02/03/2024	25/03/2024

Annex 3: Variables.

Variable	Type of Variable	Effect Measures
Number of patients who presented the outcome	Quantitative: Discrete	Mean difference. Standard Deviation
Number of patients who didn't present the outcome	Quantitative: Discrete	Mean difference. Standard Deviation
Type of surgery performed	Qualitative	Proportion. Relative Risk. Odds ratio
Age	Quantitative: ratio	Mean difference. Standard Deviation
Sex	Qualitative: dichotomous	Proportion. Relative Risk. Odds ratio
Personal background	Qualitative: Nominal, polytomous	Proportion. Relative Risk. Odds ratio

Annex 4: Eligibility Criteria.

		Trip	Pubmed	Clinical key	Science direct	Embase
INCLUSION CRITERIA	LANGUAGE (ENGLISH, SPANISH, PORTUGUESE, FRENCH)					
	YEAR (LAS 20 YEARS)					
	FULL TEXT AVAILABILITY					
TYPE OF STUDY	ECA,RCT	mesh	mesh	mesh	mesh	mesh
	SYSTEMATIC REVIEW					
	META-ANALYSIS					
	CASE-CONTROLS					
	COHORTS					
	TOTAL					

Discussion

Among the seven studies included in this systematic review, multiple scales for the assessment of pre- and post-surgical functionality were used, which presents challenges for the comparison of outcomes between the selected studies. Nevertheless, it was demonstrated that all the scales employed are valid for the evaluation of functional outcomes. There are not many studies in the pediatric population that compare functional scales; for example, Rolf Haye et al. conducted a study involving

patients 16 years of age and older, which aimed to evaluate both versions of the NSQ in patients undergoing septoplasty to determine the accuracy of the instrument and its ability to detect changes in pre-and post-operative symptoms [16].

Consequently, the Nasal ASymptom Questionnaire (NSQ) demonstrated high accuracy in evaluating nasal symptoms and the capacity to detect changes in symptoms after either short- or long-term nasal surgery [16].

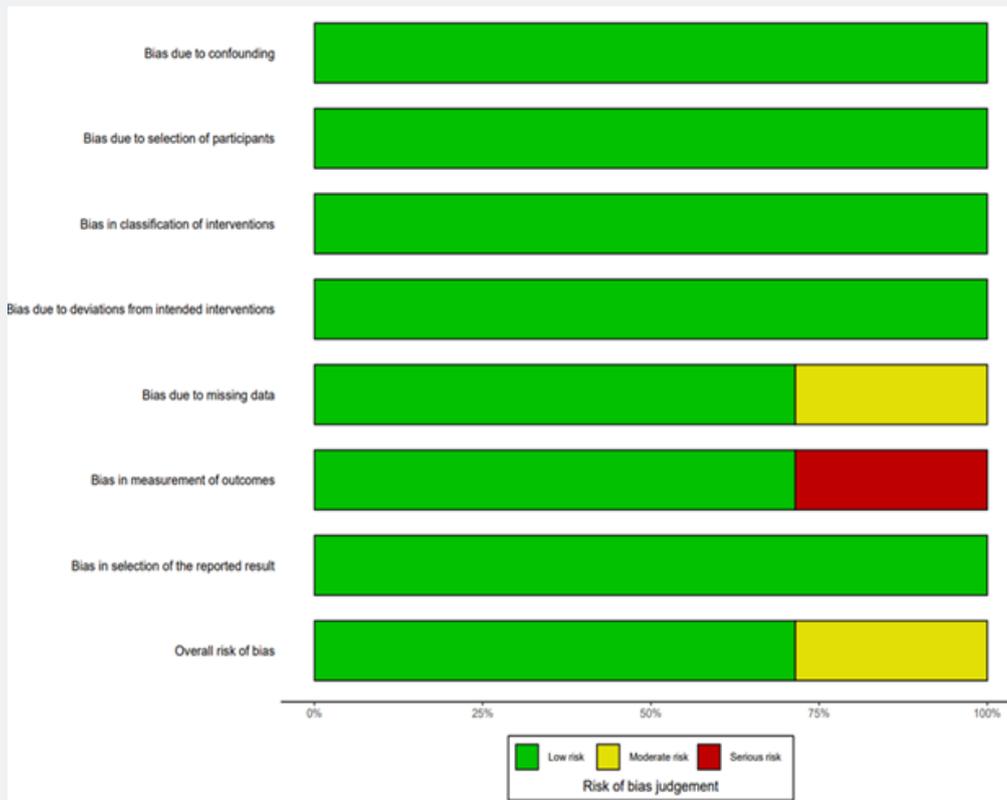


Figure 2: Overall evaluation of biases by domains, tool ROBINS1.

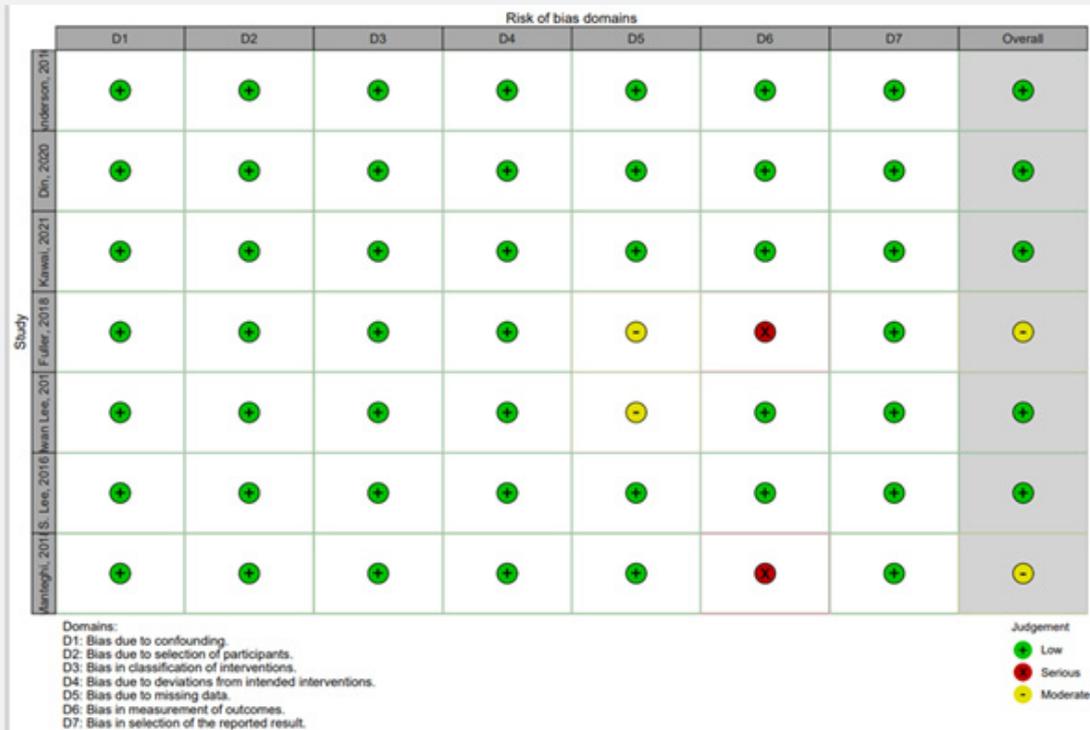


Figure 3: Specific Domain Bias Assessment, ROBINS1 tool.

Meanwhile, in a study involving patients over 18 years of age, Shukla R et al. compared the use of the NOSE scale vs. Visual Analogue Scale (VAS) pre- and post-surgically to assess functionality in patients who underwent septoplasty. The results showed that both scales are valid for the assessment of functionality. However, the NOSE scale scores reflected greater improvement, and a higher rate of patient satisfaction compared to VAS [17]. Although the studies on pediatric nasal surgery with outcome measurements are not numerous, the existing ones show favorable functional results. Notably, comparisons between different age groups or surgical approaches (open versus closed) did not yield significant differences in outcomes [20]. Furthermore, the presence of a confounding variable like allergic rhinitis did not significantly affect the NOSE scores [15]. Additionally, one study highlights that nasal surgery can safely be performed in pediatric patients using conservative techniques that avoid disruption of key structures such as growth centers [19].

Even though the NOSE was initially developed and validated in adults, in at least two cases this tool has shown strong reliability and internal consistency [15,21]. Recent studies have shown that the NOSE scale is both valid and reliable and can be incorporated as a tool to evaluate quality of life among pediatric patients undergoing septoplasty or functional septorhinoplasty [18,21]. While controversies persist about performing nasal surgery on patients of an early age, studies on functional results showed no significant differences across pediatric age ranges. Moreover, the pediatric patient's motivation and willingness to undergo surgery have positively influenced postoperative outcomes, suggesting the importance of their active participation in the decision to perform the procedure [14]. In terms of psychological involvement, at least one study has indicated high scores in postoperative assessments of physical and psychological health in both self-reports and parent/representative reports [14]. Yet, the psychological aspect has so far been examined primarily in adult patients and is still an area to be explored in younger patients.

In the evaluated studies, Anderson et al were the only to evaluate the psychological outcome, which is consistent with the scarcity of literature on the psychological aspects of nasal surgery, especially on pediatric patients [14]. It is not yet clear how and to what extent a patient benefit psychologically from a septorhinoplasty [24]. However, it has been observed that the positive effect of the operation on the patient's body image and the perception of the corrected body part become evident 3 months after the operation and is maintained for more than 2 years after the procedure [24,25]. Mental health can condition the patient's perception of the septorhinoplasty's result and so the psychology of patients is a key factor that must be considered before any surgical procedure such as septorhinoplasty is performed [26]. The literature describes several personality traits that are considered unfavorable to cosmetic surgery. These include being overly demanding, overly flattering, privacy-insistent, obsessive, perfectionists, and addicted to the operating room [24,25]. These

characteristics can become challenging to identify and are unlikely to be observed in young patients.

Among the limitations of the study are the inclusion of literature published in Spanish, English, Portuguese, French or German only. In addition, the primary studies lacked a universal measurement tool and nor standardization of the results, which precluded quantitative analysis such as meta-analysis. This underscores the necessity for a validated tool to objectively assess the functional and psychological outcomes of nasal surgery. Furthermore, the heterogeneity in pediatric population's body development complicates the standardization of results. Finally in evaluating articles for bias, two were found to have high probability of bias in domain #6, related to the outcome measurement tool.

Conclusion

From this systematic review, we conclude that early nasal surgeries in pediatric populations yield favorable subjective results regarding improvement in functionality. However, there is no consensus regarding the use of a general scale to assess these outcomes within this population. Thus, it is essential to carry out new primary studies that can determine the possible outcomes, after nasal surgery, as well as the standardization of a scale that allows their assessment in pediatric patients. Finally, regarding the psychological impact, we found that involving children in the decision-making process for early surgical treatment is associated with better psychological outcomes.

Conflict of Interest

The authors declare that there is no conflict of interest.

References

1. Kalantar Hormozi A, Ravar R, Abbaszadeh-Kasbi A, Rita Davai N (2018) Teenage Rhinoplasty. *World journal of plastic surgery* 7(1): 97-102.
2. The Aesthetic Society's Cosmetic Surgery National Data Bank: Statistics 2019, *Aesthetic Surgery Journal* 40(1): 1-26.
3. Kopacheva Barsova G, Nikolovski N (2016) Justification for Rhinoseptoplasty in Children – Our 10 Years Overview. *Open Access Macedonian Journal of Medical Sciences* 4(3): 397-403.
4. Kamil RJ, Roxbury C, Boss E (2019) Pediatric Rhinoplasty: A national surgical quality improvement program analysis. *The Laryngoscope* 129(2): 494-499.
5. El Hakim et al. (2001) A study anthropometric measures before and after external septoplasty in children. *Arch Otolaryngol Head and Neck Surgery* 127(11): 1362-1366.
6. Cemal Cingi, Nuray Bayar Muluk, Seckin Ulusoy, Andrey Lopatin, Ethem Şahin, et al. (2016) Septoplasty in children. *Am J Rhinol Allergy* 30(2): e42-e47.
7. Luca D'Ascanio, Carla Lancione, Giorgio Pompa, Elena Rebuffini, Nicola Mansi, et al. (2010) Craniofacial growth in children with nasal septum deviation: A cephalometric comparative study. *International Journal of Pediatric Otorhinolaryngology* 74(10): 1180-1183.
8. Garay Celeste (2007) Pediatric nasal surgery: timing and technique. *Reporting Currency Opin Otolaryngol, head and neck surgery* 25(4): 287-290.

9. Lawrence R (2012) Pediatric septoplasty: a review of literature. *Int J Pediatr Otorhinolaryngol* 76(8): 1078-1081.
10. Tasca I, Compadretti GC (2011) Nasal growth after pediatric septoplasty at long-term follow-up. *Am. J. Rhinol. Allergy* 25: e7-e12.
11. Funamura J, Sykes J (2014) Pediatric Septorhinoplasty. *Facial Plast Surg Clin N Am* 22(4): 503-508.
12. Higgins JPT, Green S (editors) (2011) *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration.
13. Guyatt G, Oxman A, Sultan S, Glasziou P, Akl E, et al. (2011) GRADE guidelines: 9. Rating up the quality of evidence. *Journal of Clinical Epidemiology* 64(12): 1311-1313.
14. Anderson K, Ritchie K, Chorney J, Bezuhly M, Hong P (2016) The impact of septoplasty on health-related quality of life in paediatric patients. *Clinical Otolaryngology* 41(2): 144-148.
15. Manteghi A, Din H, Bundogji N, Leuin S (2018) Pediatric septoplasty and functional septorhinoplasty: A quality-of-life outcome study. *International Journal of Pediatric Otorhinolaryngology* 111: 16-20.
16. Haye R, Tarangen M, Shiryayeva O, Dosen L (2015) Evaluation of the Nasal Surgical Questionnaire for Monitoring Results of Septoplasty. *International Journal of Otolaryngology* 2015: 1-7.
17. Shukla R, Nemade S, Shinde K (2020) Comparison of visual analogue scale (VAS) and the Nasal Obstruction Symptom Evaluation (NOSE) score in evaluation of post septoplasty patients. *World Journal of Otorhinolaryngology - Head and Neck Surgery* 6(1): 53-58.
18. Kais A, Sinan M, Crawford A, Rose AS, Gudis DA, et al. (2023) Improvement in quality of life after Septoplasty in children: A systematic review. *International Forum of Allergy & Rhinology* 13(11): 2076-2081.
19. Fuller J, Levesque P, Lindsay R (2018) Functional septorhinoplasty in the pediatric and adolescent patient. *International Journal of Pediatric Otorhinolaryngology* 111: 97-102.
20. Lee V, Gold R, Parikh S (2016) Short-term quality of life outcomes following pediatric septoplasty. *Acta Oto-Laryngologica* 137(3): 293-296.
21. Kawai K, Dombrowski N, AuYeung T, Adil EA (2021) Validation of the Nasal Obstruction Symptom Evaluation Scale in Pediatric Patients. *Laryngoscope* 131(9): E2594-2598.
22. Din H, Bundogji N, Leuin SC (2019) Psychometric evaluation of the nasal obstruction symptom evaluation scale for pediatric patients. *Otolaryngology-Head and Neck Surgery* 162(2): 248-254.
23. Yilmaz MS, Guven M, Akidil O, Kayabasoglu G, Demir D, et al. (2014) Does Septoplasty improve the quality of life in children? *International Journal of Pediatric Otorhinolaryngology* 78(8): 1274-1276.
24. Tasman A (2010) The psychological aspects of rhinoplasty. *Current Opinion in Otolaryngology & Head and Neck Surgery* 18(4): 290-294.
25. Saleh H, Rennie C (2018) Assessment and the Psychological Aspects for Septorhinoplasty. *International Journal of Head and Neck Surgery* 9(1): 38-45.
26. Pirochmai P, Suetrong S, Arunpongpaisal S (2011) Psychological Status in Patients Seeking Rhinoplasty. *Clinical Medicine Insights: Ear, Nose and Throat* 4: 31-35.



This work is licensed under Creative Commons Attribution 4.0 License
DOI: [10.19080/GJO.2024.27.556207](https://doi.org/10.19080/GJO.2024.27.556207)

Your next submission with Juniper Publishers will reach you the below assets

- Quality Editorial service
- Swift Peer Review
- Reprints availability
- E-prints Service
- Manuscript Podcast for convenient understanding
- Global attainment for your research
- Manuscript accessibility in different formats
(Pdf, E-pub, Full Text, Audio)
- Unceasing customer service

Track the below URL for one-step submission

<https://juniperpublishers.com/online-submission.php>