Original Article

The Cleft Palate Craniofacial Journal
1-9

DOI: 10.1177/10556656241283186
journals.sagepub.com/home/cpc

Postoperative Feeding in Cleft Surgery: A Systematic Review

Patricia Fuentes, BS[1], Soroush Farsi, BS[2], Jose A. Garcia, BS[3], Wassim Najjar, BS[3], Adam Johnson, MD, PhD[4], and Usama Hamdan, MD, FICS[3]

Abstract

Introduction: Postoperative feeding is crucial for the recovery of children after cleft surgery. The literature outlines diverse feeding methods with varying recommendations on the duration of non-nipple feeding postsurgery. This study aims to explore reported postoperative feeding modalities for infants undergoing primary cleft lip/palate repair, concentrating on their influence on feeding improvement and complication reduction.

Methods: PubMed, Cochrane, and Web of Science databases were queried for original English articles without any date restrictions. This review was conducted in accordance with the 2020 PRISMA. The MINORS criteria was used to assess quality of studies.

Results: Of 696 abstracts, 9 full-text articles were included, consisting of 459 children with cleft lip (n = 221) & cleft lip/palate (n = 238). Feeding modalities included bottle, breastfeeding, spoon, syringe, and nasogastric tube. Two studies found a significant increase in weight with breastfeeding compared to spoon or cup. Two studies found partial wound dehiscence using spoons, and two studies reported dehiscence using bottles. Post-palatoplasty, two studies showed a decrease in hospital stay in infants breastfed (2.1 & 5.8 days) vs spoon-fed (6 days). Analgesia was reduced in the breastfed group vs spoon/nasogastric tube.

Conclusion: This review highlights the importance of postoperative feeding in the recovery of infants with cleft lip/palate. Evidence suggests that breastfeeding may offer advantages in terms of weight gain and reduced hospital stay, while potentially minimizing the need for postoperative analgesia. The limited number of studies and variability in their outcomes underscore the need for further research to establish evidence-based guidelines for postoperative feeding.

Keywords

cleft palate, cleft lip and palate, feeding, craniofacial surgery

Introduction

Cleft lip and/or palate (CLP) are among the most common congenital anomalies affecting 1-700 life birth infants worldwide, with a significant impact on feeding, speech, hearing, and psychosocial development.[1,2] The surgical correction of these anomalies is essential for enhancing functional outcomes and the quality of life. Nonetheless, postoperative care, particularly feeding practices, significantly influences the recovery and overall well-being of these infants. Breastfeeding and bottle-feeding are typically restricted immediately after cleft lip repair to prevent tension on the surgical incision. Instead, alternative feeding methods such as using a spoon, cup, or syringe are advised.[3] Some studies recommended using a very soft nipple of adequate size to ensure a dripping milk flow, thus minimizing tension on the surgical site.[4] Some other studies suggest spoon-feeding for a specific duration after cleft lip repair to further minimize tension.[4] However, the post-surgical management of CLP varies across countries and healthcare centers and the decision regarding breastfeeding techniques has sparked debates due to concerns about surgical wound dehiscence and the nutritional status of the infant.[5]

[1] Florida International University Herbert Wertheim College of Medicine, USA
[2] University of Arkansas for Medical Sciences, USA
[3] Global Smile Foundation, USA
[4] University of Arkansas for Medical Sciences, Arkansas Children's Hospital, USA

Corresponding Author:
Patricia Fuentes, Florida International University Herbert Wertheim College of Medicine, USA.
Email: Pfuen013@med.fiu.edu

The feeding difficulties faced by infants with cleft conditions are extensively documented. These challenges encompass nasal regurgitation, decreased breastfeeding capability, prolonged feeding durations, colic and vomiting due to excessive air intake, oral mucosa ulceration, and otitis media.[6–16] Therefore, it is crucial for new parents to understand these challenges and learn appropriate feeding methods that best suit their children's condition. The main goal of this systematic review is to assess the influence of various feeding methods on the healing of surgical wounds and evaluating the impact of these feeding techniques on postoperative weight gain, hospital length of stay and infant stress levels. This review aims to offer guidance for clinical practice and provide valuable insights to healthcare providers, caregivers, and families regarding the most effective postoperative feeding approaches.

Methods

Data Sources and Search Strategies

A comprehensive search of several databases from each database's inception to November 2023, was conducted in compliance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.[17] The databases included PubMed, Embase and Web of Science. The search strategy was designed and conducted by an experienced librarian with input from the study's principal investigator. A controlled vocabulary supplemented with keywords was utilized to search for terms including "Breastfeeding", "feeding methods", "Cleft Palate", "Cleft lip" and "Postoperative period" in pediatric patients. The actual strategy listing all search terms used and how they are combined is available in Supplementary Item 1. All languages were included in the search algorithm, but only English language studies or full-length international journals with English translation were included for further analysis. References of all publications were also subjected to review for potential inclusion criteria. Articles with available full texts were screened, and duplicated articles were removed. A qualitative synthesis of the presentation, risk factors, feeding methods, treatment, and post treatment outcomes for all of the studies was employed to integrate study results. This review was registered on PROSPERO under Postoperative Feeding in Cleft Surgery: A Systematic Review (CRD42023491113). No amendments were made to the study protocol. The level of evidence is considered level V. Due to variability in study design and outcome measured, formal synthesis in the form of a meta-analysis was not possible. The ensuing discourse amalgamates findings pertaining to patients who have undergone CLP surgery, focusing on outcomes associated with feeding, including weight gain and growth.

Eligibility Criteria and Quality Assessment

Eligible studies were cohort studies meeting the following inclusion criteria: (1) involvement of pediatric patients who underwent CLP surgery, (2) reporting outcomes related to feeding, such as weight gain and growth, and (3) absence of restrictions on the geographical location or setting of the study. Exclusion criteria included studies that were case reports, case series, abstracts, conference abstracts, and articles not reported in English. Additionally, studies lacking sufficient data on feeding outcomes or primarily focusing on other surgical interventions unrelated to feeding were excluded. The quality of each study was independently evaluated by two authors (SF and PF) using the Minors criteria.[18] RCT studies used a critical appraisal skills program (CASP) for article quality assessment. Any discrepancies were discussed by two independent assessors, with disagreements addressed via an adjudicator (JG). Results of the quality assessment of all included studies are shown in Supplementary Item 2,3.

Data Extraction

The following variables were extracted from the included studies: year of publication, intervention topic (such as specialty bottle, alternative feeding delivery system, obturator, or educational programs), country of origin, sample size, number of centers involved in the study, cleft type, patient age, age range, name of intervention, name of comparator intervention, study design, hospital stay duration, follow-up period, and outcome(s) of interest.

Results

Study Selection and Patient Characteristics

The initial literature search of the electronic databases yielded 696 studies. After removing duplicates, 497 articles were screened for inclusion and exclusion criteria, and 18 studies were retained for full-text review. Nine unique studies involving 459 patients diagnosed with cleft lip (n = 221) & CLP (n = 238) were included in this systematic review. Two reasons for excluding the paper during full-text review were incorrect study outcomes and inappropriate study design. Of the 9 studies, 4 were retrospective and 4 were randomized controlled trials (RCT) and one cross sectional survey. All 9 studies included were single institutional studies. Four studies examined populations from North America,[19–21] one from South America,[22] two from Europe[23,24] and two from Asia.[25–27] The age of the included patients ranged from 3 days to 15 months. A PRISMA flowchart of the study selection process is depicted in Figure 1. The baseline characteristics of the included studies are described in Table 1. Amongst the studies reviewed, bottle (67%) and breastfeeding (55%) were the most common interventions discussed. Other feeding interventions identified included spoon (n = 4), syringe (n = 3), nasogastric tube (n = 1) and cup were less common (Table 2). The parameters assessed across the identified studies are weight outcomes, food intake, surgical wound dehiscence, and observed patient satisfaction.

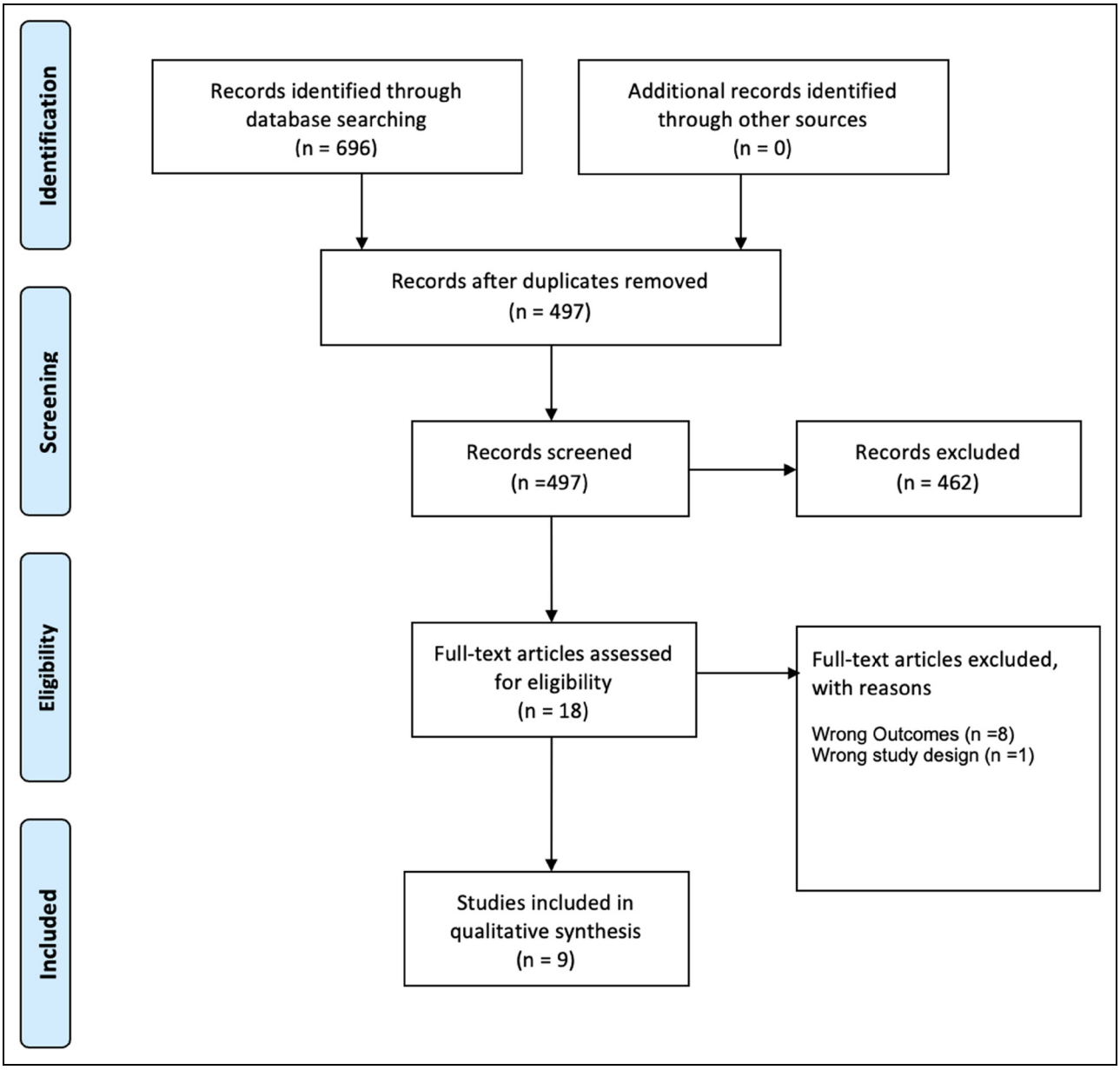

Figure 1. PRISMA flow diagram.

Risk of Bias

MINORS criteria items to assess risk of bias are presented in Supplementary Item 2. Overall quality was moderate and included nine studies. The mean (range) MINORS score was 10.8 (8- 13). Common weaknesses in these studies included lack of prospective calculation of sample size, unblinded assessment of endpoints, and Loss to Follow-Up <5%. The results of the risk of bias with an RCT design is shown in Supplementary Item 3. The reviewed studies explained the randomization method, participants were given the similar treatment during the study. All randomized clinical trials received positive ratings on more than half of the items, indicating their classification as high-quality studies.

Weight Outcomes

Five studies evaluated weight changes with the implementation of a feeding modality after cleft surgery.[19,20,22,25,26] One retrospective study compared outcomes between tube/syringe and bottle/nipple feeding modalities.[19] In this study, 80 children undergoing cleft surgery were equally divided amongst the two study groups. Postoperative weight outcomes reported greater weight improvement for infants fed with a bottle/nipple combination compared to those using a syringe/tube, however this data was reported as observational. The study by Darzi et al. included 40 infants with cleft lip that were either fed via breastfeeding or spoon following cleft lip repair. Weight outcomes were evaluated at 3 weeks pre-

Table 1. Study Characteristics in Systematic Review.

Year	First Author	Country	Study Design	Number of Patients	Patient Age (months)	Patient Sex (# female)	Cleft type
2005	Assunção et al.[22]	Brazil	RCT	45	3-13	NR	Cleft lip
2017	Burianova et al.[23]	Czech Republic	Retrospective chart review	104	NR	34	Cleft lip (n = 56), Cleft lip and palate (n = 48)
1992	Cohen et al. [19]	USA	Retrospective chart review	80	Unilateral CL (4 days - 3 months); Bilateral CL (2-7 months); CP (3-12 months)	NR	Cleft palate and Cleft lip
1996	Darzi et al.[25]	India	RCT	40	3-6	NR	Cleft lip
2014	Dhaiban et al.[27]	Pakistan	RCT	40	3-15	NR	Cleft lip
2009	Kent et al.[24]	UK	Retrospective chart review	68	NR	NR	Cleft palate
2009	Kim et al.[26]	Korea	RCT	82	NR	44	Cleft palate
1987	Weatherley-White et al.[20]	USA	Retrospective chart review	NR	NR	NR	Cleft palate
2023	Williams et al.[21]	USA	survey based study	NR	NR	NR	Cleft palate

Abbreviations: NR, Not reported; RCT, Randomized controlled trial.

operative and 6 weeks post-operative.[25] At the 6 week postoperative mark, infants who were breastfed had a higher mean weight of 6.35 kg, in contrast to spoon-fed infants whose mean weight was recorded as 5.88 kg. However, no statistically significant differences were determined in this study.[25] Two studies that compared bottle/nipple and spoon feeding did not observe any significant differences in weight outcomes between the study groups.[22,26] Additionally, one retrospective study of 38 infants with cleft palate who were either fed via breast feeding (16) or cup (22), found that amongst the breastfed cohort, the percentage of weight gain was 28% at 1 month postoperative and increased to 67% at 3 months. In comparison, cup-fed infants demonstrated a weight gain percentage of 16% at 1 month postoperative and 50% at 3 months.[20]

Food Intake and Patient Reaction to Feeding

Two studies reported food intake.[22,26] Assunçao et al. conducted a randomized control study of 45 infants (3-13 months) with cleft lip who had undergone surgical repair and study participants were divided into either a bottle- or spoon-feeding group.[22] This study found no significant differences in food intake quantity between the two feeding modalities. Moreover, 21.7% of spoon-fed infants resisted feeding at first day postoperatively. Similarly, Kim et al. included 82 infants with cleft palate that were divided into two groups of bottle/nipple or spoon/cup/syringe.[26] For the first 5 postoperative days, the study did not find any significant differences between groups. Oral intake, however, was significantly higher six days post-op in infants fed with a bottle/nipple device ($p = 0.042$). Kent et al. conducted a retrospective chart review of 68 infants with cleft palate who had either used nasogastric tube (n = 34) or bottle (n = 34) feeding.[24] This study found that bottle-fed infants were more inclined to refuse feeds and were more likely to scream during feeding in contrast to infants who were fed with nasogastric tubes who were more settled, and had more regular milk feeds.[24]

Wound Dehiscence Associated with Feeding Modalities

Assunçao et al. reported homogeneous presence of edema, dehiscence, bleeding and hematomas across all groups (bottle and spoon).[22] Two studies found wound dehiscence in infants who were fed with a spoon.[25,27] Darzi et al. noted one partial dehiscence in the spoon-fed group in infants with cleft lip.[25] Similarly, Dhaiban et al. reported partial wound dehiscence in two patients fed with a spoon and one patient who was fed with breast/bottle.[27] Another study reported the incidence of oronasal fistulas in four infants fed with a bottle and in five patients fed with a spoon.[26]

Hospital Stay and Analgesia use

Darzi reported a slightly shorter mean postoperative hospital stay for the breastfed group (5.80 days) compared to the spoon-fed group (6 days). This difference did not reach statistical significance. Moreover, spoon-fed infants required analgesia and intravenous fluids more frequently and for longer durations than breastfed infants.[25] The duration of inpatient stay showed a significant reduction in the nasogastric tube group, with approximately 45% being discharged within 48 h. In contrast, only 26% of the bottle-fed group experienced such a rapid discharge.[24] As reported by Kent et al., less analgesia was administered to the bottle-fed group due to concerns

Table 2. Study Outcomes in Systematic Review / Clinical Characteristics.

First Author	Study Design	Intervention type	Assessed parameters	Weight	Food Intake	Surgical wound analysis	Outcomes	Hospital Stay
Assunção et al.[22]	RCT	Bottle and Spoon	Wight, Wound Dehiscence, Infection, Ingestion Amount	No significant difference between groups	No significant difference between groups	No significant difference between groups	Spoon & bottle-feed has a similar influence on wound & nutrition. Bottle feed should be attempted after cheiloplasty	NR
Burianova et al.[23]	Retrospective chart review	Breastfeeding, bottle or syringe	Wound dehiscence, hospital stay	NR	NR	No significant difference between groups	Infants with CL can be breastfed regardless of surgery time. Low rates of breastfeeding in CLP.	Shorter for cleft lip across all feeding modalities ($p = .022$).
Cohen et al. [19]	Retrospective chart review	Tube/syringe and bottle/ nipple	Wound dehiscence, weight	Post op weight improved more for bottle/nipple than with syringe/tube	NR	1 partial lip dehiscence in tube/syringe group. 1 fistula in soft and hard palate on both groups.	Breast or bottle-feeding in the immediate postoperative time is safe. No incidence of complications related to early unrestricted feeding.	NR
Darzi et al.[25]	RCT	Breastfeeding and spoon	Weight (pre op 3 weeks, post op 6 weeks), hospital stay	6 weeks post op the mean weight of breast fed (6.35 kg) infants was higher than spoon fed (5.88 kg)	NR	1 partial dehiscence (spoon fed)	Support the use of breastfeeding after cleft lip repair.	Breast feeding (mean: 5.8days) and spoon (mean: 6 days). Not statistically significant.
Dhaiban et al.[27]	RCT	Spoon, breast/ bottle	Wound dehiscence	NR	NR	Spoon: partial dehiscence in 2 patients. Breast/Bottle: partial dehiscence in 1 patient	Recommend unrestrained breast or bottle-feeding after cleft lip repair.	NR
Kent et al.[24]	Retrospective chart review	Nasogastric tube and bottle	Coping with post op feeding, analgesia, length of stay	NR	NG: more consistent milk feeds. Bottle: more inclined to refuse &	NR	Positive indication for NG tube post-palatoplasty to reduce emotional strain & physical effort of feeding.	NG: 45% discharged in 48 h with full dose of analgesics. Bottle: 26% percent discharged in 48hrs

(continued)

Table 2. (continued)

First Author	Study Design	Intervention type	Assessed parameters	Weight	Food Intake	Surgical wound analysis	Outcomes	Hospital Stay
					scream during feeds			and less analgesia as most was spat out.
Kim et al.[26]	RCT	Bottle w/ nipple and Spoon/ Cup/ Syringe	Weight, Oral intake, Post Op sedative use	Weight gain after 1 & 2 months did not differ significantly	No significant difference between groups in oral intake for the first 5 days. Oral intake higher post day 6 for bottle/ nipple ($p = 0.042$).	Bottle: 1 dehiscence and 4 oronasal fistulas. Spoon: 5 oronasal fistulas ($P = 1.000$)	Bottle-feeding could be used in immediate postoperative time. It did not affect cleft palate repair.	Mean post op sedation administration was similar in bottle and spoon groups (1.33 vs 1.35, $p = 0.950$)
Weatherley-White et al.[20]	Retrospective chart review	Breast and cup-feeder	Weight gain	Breast: 1 mo (28% increase), 3 mo (67%). Cup: 1 mo (16%), 3 mo (50%).	NR	NR	Breastfed groups attained more adequate oral intake than cup-fed group	Breast: mean 2.1 days Cup: 3.3 days
Williams et al.[21]	survey based study	Survey ($n = 87$)	Feeding type, setting of feeding, education on feeding	NR	NR	NR	77% reported using Dr. Brown's bottle for a first trial. 56% of providers varied recommendations by patient.	NR

Abbreviations: NR, Not reported; mo, Months; CL, Cleft lip; CLP, Cleft lip and palate; RCT, Randomized controlled trial.

that most of it would be spat out. Parents and staff were also worried about the distress caused by coughing and gagging in this group.[24] Conversely, infants with a nasogastric tube received their full dose of analgesics regularly. In Weatherly-white et al., the breastfed group exhibited a shorter hospital stay (mean of 2.1 days) compared to the cup-fed group (mean of 3.3 days).[19,20,22,25,26] Furthermore, they reported that the mean postoperative sedative administration was similar in both study groups (bottle/nipple versus spoon/cup/syringe), with no statistically significant difference observed (1.33 vs. 1.35, $p = 0.950$).

Clinical Outcomes Based on the Defect Location

Four studies exclusively focused on patients with cleft palate,[20,21,24,26] while two included patients with cleft lip.[25,27] Partial dehiscence was the sole post-operative complication in the cleft lip group ($n = 4/80$), whereas the cleft palate group reported oronasal fistulas ($n = 4/82$) in addition to dehiscence (1/84) as post-operative side effects. Patients in both the cleft lip and palate groups who were breastfed exhibited higher weight gain compared to spoon- or cup-fed infants. Similarly, breastfed patients spent less time in the hospital post-operatively compared to their counterparts in both groups. We did not observe a noticeable difference between the cleft palate and cleft lip cohorts in terms of post-operative outcomes and weight gain, despite their differing defect locaiton.

Discussion

Congenital CLP stands as one of the most prevalent craniofacial birth deformities among pediatric patients.[28] Consequently, it is imperative to devise optimal care strategies for infants afflicted with this congenital condition. A critical aspect of the comprehensive cleft care paradigm involves understanding how different feeding methods post cleft surgery influence healing and recuperation. This systematic review underscores the potential advantages and drawbacks associated with postoperative feeding approaches in infants undergoing cleft surgery. Within our review, we delve into the impact of various feeding modalities such as breastfeeding, spoon feeding, syringe feeding, bottle feeding, and nasogastric tube feeding on factors including wound healing, weight gain, overall outcomes, and length of hospital stay.

Wound dehiscence related to feeding modalities varied across studies. While one study reported similar postoperative outcomes in infants who used bottle and spoon feeding,[22] Darzi et al. and Dhaiban et al. observed partial wound dehiscence in spoon-fed instants.[25,27] Kim et al. noted oronasal fistulas in both bottle and spoon-fed infants.[26] One retrospective study attributed the appearance of oronasal fistulas after cleft surgeries to poor wound healing, tension or absence of multilayer repair, or wound dehiscence.[28] The rate of fistula has been reported in the literature to be between 33% and 37% after cleft surgery, which remains a challenge for infants recovering from cleft repair.[29] The common occurrence of fistula and dehiscence in patients following cleft surgery emphasizes the need to also understand if feeding modalities can improve or impede outcomes. Further randomized control studies with larger sample sizes are needed to better understand the relationship between feeding modalities and wound dehiscence following cleft surgery.

Feeding difficulties in infants with CLP have been widely documented in the literature, as well as the impact of poor nutritional intake on growth and development.[30] The evidence from the included studies suggests varied effects on postoperative weight outcomes. Cohen et al. reported greater weight improvement in infants fed with a bottle/nipple combination compared to syringe/tube. Moreover, Darzi et al. observed a higher mean weight in breastfed infants post-cleft lip repair. The evidence suggests that there may be some additional benefits associated with breastfeeding postoperatively compared to other feeding modalities. In the case that breastfeeding cannot be done, future studies can investigate alternative options for infants that have undergone cleft surgery. The absence of statistical significance in some of the included studies that report weight outcomes with the use of postoperative feeding modalities emphasizes the need for further research.

The main objective of cleft lip surgery is to enable effective feeding for the child while safeguarding the surgical site. The American Cleft Palate-Craniofacial Association suggests utilizing specialized bottles with valves or syringes to aid feeding, thus alleviating pressure on the lip and ensuring comfort during feeding.[31] Breastfeeding remains an option, although requiring adjustments in positioning to accommodate the cleft. Spoon feeding is another viable method, with a recommendation to introduce soft foods gradually to avoid nasal irritation. Conversely, addressing feeding challenges post cleft palate repair involves more intricate considerations due to mouth anatomy alterations. Here, the priority remains ensuring efficient feeding without jeopardizing the surgical outcome.[32] Similarly, specialized bottles or syringes are advised to facilitate feeding, with breastfeeding posing challenges necessitating shorter sessions and possible supplementation with bottles. Bottle feeding in a semi-upright position is recommended to minimize liquid entry into the nasal passage.[32] Spoon feeding, coupled with gradual introduction of soft foods, is also advocated to prevent nasal irritation. According to the findings of the included studies, although information was limited, our study revealed that patients in both the cleft lip and palate groups showed higher weight gain when breastfed compared to infants fed with spoon or cup methods.

Hospital stay following cleft surgery is an important metric of efficiency of care and postoperative complications. A reduction in length of stay can minimize hospital-associated complications such as increased risk of infection, cost, and stress.[33] Furthermore, there is a consensus among medical experts that infants undergoing cleft surgery should commence feeding shortly after the procedure. However, contrasting viewpoints arise from certain studies advocating for limitations on postoperative feeding.[34] Darzi et al. reported a slightly

shorter hospital stay for breastfed infants, whereas Kent et al. found a reduction in inpatient stay for infants fed with a nasogastric tube. Although there is limited evidence to suggest any one feeding modality can have a significant impact on hospital stay duration, these findings still underscore the importance of considering the impact that feeding modalities can have on immediate postoperative recovery. More randomized control studies are needed to evaluate the effect of feeding modalities on the immediate postoperative recovery and hospital length of stay of infants with CLP repair.

The evidence from this systematic review suggests that breastfeeding may have a positive impact on weight gain and postoperative hospital stay. Additionally, the studied feeding modalities may have varying effects on other parameters including food intake and wound dehiscence. These results strongly suggest a need for future studies that specifically analyze the impact of feeding modalities on various parameters important for the recovery of infants with CLP repair. Cleft lip, cleft palate, or both are extremely common congenital differences that impact growth and development, as such it is important to devise optimal postoperative strategies and guidelines to maximize recovery while limiting complications. While the included studies provide valuable insights into the impact of feeding modalities on postoperative outcomes in infants with cleft repair, future research should focus on including larger sample sizes and longer follow-up periods. Additionally, investigating the long-term implications of feeding modalities on growth and development is crucial for a more comprehensive understanding.

Limitations

This systematic review is valuable for understanding current research, yet it faces several limitations. One prominent issue is the heterogeneity among the included studies, notably in terms of methodologies, measured outcomes, and the age range of patients. Given the rapid changes in a patient's body at certain ages, this diversity complicates drawing definitive conclusions or generalizing findings across various settings and age groups. Some of the included studies combined postoperative outcomes and complications for both left lip and palate surgeries, while others did not provide sufficient data on post-surgical outcomes to draw conclusions regarding the efficacy of different feeding methods for each surgical type. Moreover, some studies included in the review are retrospective in nature, and reliance on self-reported or subjective measures to assess feeding outcomes introduces potential bias, thus impacting data reliability. Another key limitation of our review is the lack of detailed data on preoperative feeding status, data on specific surgical procedures performed, and other relevant factors in the included studies. This data gap restricted our ability to fully explore how these factors might influence postoperative feeding outcomes. As a result, this study is a descriptive review due to variations in study designs, populations, and outcomes available in the literature. Furthermore, the lack of long-term follow-up data in many studies hinders the evaluation of sustained effects of postoperative feeding interventions on cleft surgery outcomes. Addressing these limitations could strengthen future systematic reviews in this field.

Conclusion

In conclusion, this systematic review highlights the complexities and nuances of postoperative feeding modalities in infants undergoing cleft lip and palate repair. The evidence suggests that breastfeeding may offer some advantages in terms of weight gain and reduced hospital stay, although findings across studies were not uniformly significant. The review also underscores the potential risks associated with various feeding methods, including wound dehiscence and complications like oronasal fistulas. Despite the valuable insights gained, the heterogeneity of the included studies, along with the lack of long-term follow-up, presents challenges in drawing definitive conclusions. Future research with larger sample sizes, standardized methodologies, and extended follow-up periods is needed to better understand the impact of feeding modalities on the recovery and long-term development of infants with cleft repairs.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Patricia Fuentes https://orcid.org/0009-0002-5691-519X
Jose A. Garcia https://orcid.org/0000-0003-1506-0295
Adam Johnson https://orcid.org/0000-0002-8694-8665
Usama Hamdan https://orcid.org/0000-0003-3654-7262

Supplemental Material

Supplemental material for this article is available online.

References

1. Olasoji HO, Ukiri OE, Yahaya A. Incidence and aetiology of oral clefts: A review. *Afr J Med Med Sci. Mar*. 2005;34(1):1–7.
2. Al-Namankany A, Alhubaishi A. Effects of cleft lip and palate on children's psychological health: A systematic review. *J Taibah Univ Med Sci*. Aug 2018;13(4):311–318. doi:10.1016/j.jtumed.2018.04.007
3. Matsunaka E, Ueki S, Makimoto K. Impact of breastfeeding or bottle-feeding on surgical wound dehiscence after cleft lip repair in infants: A systematic review protocol. *JBI Database System Rev Implement Rep*. Oct 2015;13(10):3–11. doi:10.11124/jbisrir-2015-2336
4. Hardin-Jones MA, Karnell MP, Peterson-Falzone SJ. *Cleft Palate Speech*. Mosby; 2009.
5. Agrawal K, Panda K. A modified surgical schedule for primary management of cleft lip and palate in developing countries.

Cleft Palate Craniofac J. Jan 2011;48(1):1–8. doi:10.1597/09-226
6. Jones WB. Weight gain and feeding in the neonate with cleft: A three-center study. *Cleft Palate J*. Oct 1988;25(4):379–384.
7. Moss AL, Jones K, Pigott RW. Submucous cleft palate in the differential diagnosis of feeding difficulties. *Arch Dis Child. Feb*. 1990;65(2):182–184. doi:10.1136/adc.65.2.182
8. Trenouth MJ, Campbell AN. Questionnaire evaluation of feeding methods for cleft lip and palate neonates. *Int J Paediatr Dent*. Dec 1996;6(4):241–244. doi:10.1111/j.1365-263x.1996.tb00252.x
9. Kogo M, Okada G, Ishii S, Shikata M, Iida S, Matsuya T. Breast feeding for cleft lip and palate patients, using the Hotz-type plate. *Cleft Palate Craniofac J*. Jul 1997;34(4):351–353. doi:10.1597/1545-1569_1997_034_0350_bffcla_2.3.co_2
10. Lee J, Nunn J, Wright C. Height and weight achievement in cleft lip and palate. *Arch Dis Child*. Jan 1997;76(1):70–72. doi:10.1136/adc.76.1.70a
11. Turner L, Jacobsen C, Humenczuk M, Singhal VK, Moore D, Bell H. The effects of lactation education and a prosthetic obturator appliance on feeding efficiency in infants with cleft lip and palate. *Cleft Palate Craniofac J*. Sep 2001;38(5):519–524. doi:10.1597/1545-1569_2001_038_0519_teolea_2.0.co_2
12. Reid J, Kilpatrick N, Reilly S. A prospective, longitudinal study of feeding skills in a cohort of babies with cleft conditions. *Cleft Palate Craniofac J*. Nov 2006;43(6):702–709. doi:10.1597/05-172
13. Britton KF, McDonald SH, Welbury RR. An investigation into infant feeding in children born with a cleft lip and/or palate in the west of Scotland. *Eur Arch Paediatr Dent*. Oct 2011;12(5):250–255. doi:10.1007/BF03262817
14. Ize-Iyamu IN, Saheeb BD. Feeding intervention in cleft lip and palate babies: A practical approach to feeding efficiency and weight gain. *Int J Oral Maxillofac Surg*. Sep 2011;40(9):916–919. doi:10.1016/j.ijom.2011.04.017
15. Alperovich M, Frey JD, Shetye PR, Grayson BH, Vyas RM. Breast milk feeding rates in patients with cleft lip and palate at a North American craniofacial center. *Cleft Palate Craniofac J*. May 2017;54(3):334–337. doi:10.1597/15-241
16. Gottschlich MM, Mayes T, Allgeier C, et al. A retrospective study identifying breast milk feeding disparities in infants with cleft palate. *J Acad Nutr Diet*. Nov 2018;118(11):2154–2161. doi:10.1016/j.jand.2018.05.008
17. Moher D, Liberati A, Tetzlaff J, Altman DG, Group P. Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *PLoS Med*. Jul 21 2009;6(7):e1000097. doi:10.1371/journal.pmed.1000097
18. Slim K, Nini E, Forestier D, Kwiatkowski F, Panis Y, Chipponi J. Methodological index for non-randomized studies (minors): Development and validation of a new instrument. *ANZ J Surg*. Sep 2003;73(9):712–716. doi:10.1046/j.1445-2197.2003.02748.x
19. Cohen M, Marschall MA, Schafer ME. Immediate unrestricted feeding of infants following cleft lip and palate repair. *J Craniofac Surg*. Jul 1992;3(1):30–32. doi:10.1097/00001665-199207000-00011
20. Weatherley-White RC, Kuehn DP, Mirrett P, Gilman JI, Weatherley-White CC. Early repair and breast-feeding for infants with cleft lip. *Plast Reconstr Surg*. Jun 1987;79(6):879–887. doi:10.1097/00006534-198706000-00004
21. Kotlarek KJ, Benson M, Williams J. Current practice patterns and training pathways for feeding infants with cleft palate. *Cleft Palate Craniofac J*. Jan 23 2023:10556656231152358. doi:10.1177/10556656231152358
22. Assunção AG, Pinto MA, Peres SP, Tristão MT. Immediate postoperative evaluation of the surgical wound and nutritional evolution after cheiloplasty. *Cleft Palate Craniofac J*. Jul 2005;42(4):434–438. doi:10.1597/02-086.1
23. Burianova I, Kulihova K, Vitkova V, Janota J. Breastfeeding after early repair of cleft lip in newborns with cleft lip or cleft lip and palate in a baby-friendly designated hospital. *J Hum Lact*. Aug 2017;33(3):504–508. doi:10.1177/0890334417706062
24. Kent R, Martin V. Nasogastric feeding for infants who have undergone palatoplasty for a cleft palate. *Paediatr Nurs*. Dec 2009;21(10):24–29. doi:10.7748/paed2009.12.21.10.24.c7401
25. Darzi MA, Chowdri NA, Bhat AN. Breast feeding or spoon feeding after cleft lip repair: A prospective, randomised study. *Br J Plast Surg*. Jan 1996;49(1):24–26. doi:10.1016/s0007-1226(96)90182-4
26. Kim EK, Lee TJ, Chae SW. Effect of unrestricted bottle-feeding on early postoperative course after cleft palate repair. *J Craniofac Surg*. Sep 2009;20(Suppl 2):1886–1888. doi:10.1097/SCS.0b013e3181b2d1d1
27. Dhaiban M. Is Restricted breast and bottle-feeding necessary following cleft lip repair? *Paediatr Child Health*. 2014:e77.
28. Diah E, Lo LJ, Yun C, Wang R, Wahyuni LK, Chen YR. Cleft oronasal fistula: A review of treatment results and a surgical management algorithm proposal. *Chang Gung Med J*. 2007;30(6):529–537.
29. Dufresne C. Oronasal fistula and nasolabial fistulas. In: Morris HL, ed. *Multidisciplinary Management of Cleft Lip and Palate.* 1st ed. Saunders; 1990:787–791.
30. Miller CK. Feeding issues and interventions in infants and children with clefts and craniofacial syndromes. *Semin Speech Lang*. May 2011;32(2):115–126. doi:10.1055/s-0031-1277714
31. , Association TACP-C. https://acpacares.org/
32. Kumar Jindal M, Khan SY. How to feed cleft patient? *Int J Clin Pediatr Dent*. May 2013;6(2):100–103. doi:10.5005/jp-journals-10005-1198
33. Nguyen C, Hernandez-Boussard T, Davies SM, Bhattacharya J, Khosla RK, Curtin CM. Cleft palate surgery: An evaluation of length of stay, complications, and costs by hospital type. *Cleft Palate Craniofac J*. Jul 2014;51(4):412–419. doi:10.1597/12-150
34. Skinner J, Arvedson JC, Jones G, Spinner C, Rockwood J. Post-operative feeding strategies for infants with cleft lip. *Int J Pediatr Otorhinolaryngol*. Dec 10 1997;42(2):169–178. doi:10.1016/s0165-5876(97)00130-4