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Review Article

Intravenous Fluids After Cleft Repair Surgery: Do They Enhance or Delay Recovery?

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Introduction

Cleft lip and palate are one of the commonest craniofacial congenital anomalies [1,2]. They may present as an isolated cleft lip or palate or as a combined defect, as a solitary complaint or as part of a syndrome. All presentations create a burden on physical, mental, and psychological health of patients and relatives [3]. Cleft defects may be isolated or part of an underlying congenital syndrome [2]. If left untreated, apart from aesthetic disfigurement, clefts may present a number of functional complications such as swallowing and feeding difficulties, limited maxillofacial development, speech and hearing problems and recurrent ear infections [3,4].

A multidisciplinary team is required for holistic management of cleft lip and/or palate repair made up of plastic surgeons, otolaryngologists, maxillofacial surgeons, specialised nurses, speech therapist, audiologist, psychologist, geneticist, and dentist [2,5]. Cleft repair surgery occurs early on in life with cleft lip ideally repaired in the first three to four months of life and cleft palate operated on in the first six to twelve months of life [3,6]. Timing of surgery is usually dictated by size and age of the baby and repair is usually planned early enough to optimise anatomy for timely development to achieve proper function [7].

Feeding post operatively is a controversial topic and different centres initiate mandatory or optional intravenous fluid regime as opposed to oral feeding only [6,8]. Intravenous fluids are a form of homeostasis used to replace fluid losses [9]. They are usually used to replace extracellular fluid losses, correct electrolyte imbalances and provide a source of glucose.

Infants have higher fluid requirements than adults mostly due to a higher metabolic rate and great caloric expenditure and also due to higher total body surface area to weight ratio, resulting in increased water losses in comparison to adults. The higher respiratory rate in infants also accounts for extra losses [10]. Clefts pose an additional possible source of fluid losses due to difficulty feeding, especially in cleft palate.

During the perioperative period, patients experience additional fluid losses. In children, clear fluid intake is allowed up to one hour before surgery [11]. Anaesthetists usually apply the Holiday and Segar formula to calculate fluid requirements in paediatric patients and this is included in a number of guidelines including APA and NICE guidelines. Isotonic fluids with low glucose concentration (1 – 2.5%) are the fluids of choice in paediatric patients less than

two years old [12]. Both hypoglycaemia and hyperglycaemia may cause neuronal injury so administering 5% dextrose without any considerations may also be harmful.

Arguments in favour and against post-operative intravenous fluids are presented in Table 1.

Table 1: Arguments in favour and against post-operative fluids only [6,8].

Arguments in favour of intravenous fluids post cleft repair surgery	Arguments against intravenous fluids post cleft repair surgery
Intravenous fluids replace inadequate oral intake in children with poor feeding post-operatively	Delay in physiological drive to normal oral feeding
	Prolonged intravenous access and higher risk of complications
	Longer length of stay

This review aims to assess the necessity of fluids post-operatively to enhance recovery. Length of stay in relation to post-operative fluid requirements will be assessed as a secondary outcome.

Table 2: Aim as per PICO Framework.

Patient	Patient with cleft lip +/- cleft palate repair
Intervention	Post-operative intravenous fluids and delayed oral feeding
Comparison	Oral feeding with no post-operative fluids
Outcome	To enhance recovery and improve length of stay

Search Strategy

An online search was conducted on Ovid Medline to answer the research question. Data from 2012 to 2022 in English language was considered. This ten-year period was chosen to obtain most recent results about the topic and cover ongoing studies.

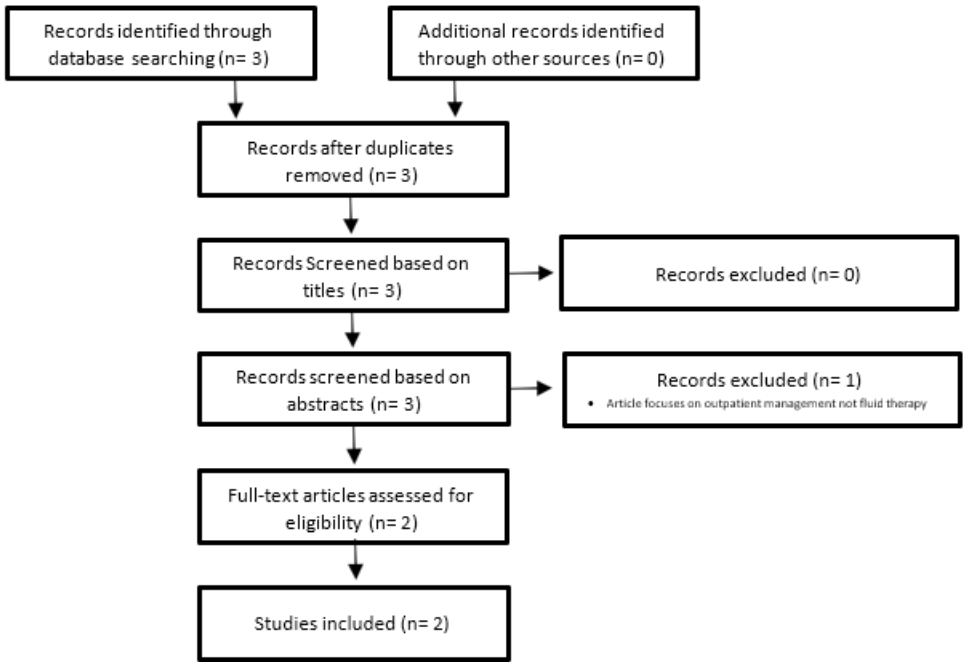

Figure 1: Prisma flowchart.

Studies retrieved were mostly retrospective observational studies. No randomised controlled trials were identified owing to the limited research available on the topic.

Two full articles will be considered for this literature review while selective data will be extrapolated from another study. Selection was based on satisfying as many criteria of the inclusion and exclusion criteria. Literature will be evaluated using the Critical Appraisal Skill Programme (CASP) checklist [13] and graded by the Harbour and Miller [14] hierarchy of evidence.

Literature Review

The studies considered include:

1) Clinical Factors Affecting Length of Stay After 100 Consecutive Cases of Primary Cleft Lip Repair by Oh et al. [15]

2) Should We Give Routine Postoperative Intravenous Fluids After Cleft Surgery? by Onyekwelu et al. [8]

3) Post-operative intravenous fluid administration for infant cleft surgery: an observational study by Rangaraju et al. [6]

Oh et al. [15] explore the Clinical Factors Affecting Length of Stay After 100 Consecutive Cases of Primary Cleft Lip Repair. They investigated cases of children who underwent primary cleft lip repair at a tertiary centre through a retrospective cohort study. The main aim was to assess the course of hundred consecutive infants and analyse the length of stay and factors contributing to it, one of which being intravenous fluid requirement and time to return to oral feeding. The main conclusion from the study was that outpatient or short-stay observation is questionable.

For the purpose of this assignment, all the paper's content will be included but results relating to

intravenous fluids only will be considered in the discussion.

Table 3

<table>
<tr><td>Search Terms</td><td>
<table>
<tr><td>Word</td><td>MeSH Terms</td></tr>
<tr><td>Cleft Lip</td><td>Cleft Lip</td></tr>
<tr><td>Cleft Palate</td><td>Cleft Palate</td></tr>
<tr><td>Intravenous Fluids</td><td>Intravenous Fluids, Fluid Therapy</td></tr>
</table>
</td></tr>
<tr><td>Inclusion Criteria</td><td>Patients who underwent cleft repair surgery
Syndromic and non-syndromic cleft lip and/or cleft palate patients
RCT or observational studies
Single or multicentre studies
Human studies
Studies from 2012 onwards
English language</td></tr>
<tr><td>Exclusion Criteria</td><td>Patients who underwent cleft repair in combination with any other surgery
Case control study, audit, case reports
Animal Studies
Studies before 2012
Any language other than English</td></tr>
<tr><td>Database Results</td><td>
<table>
<tr><td></td><td>Keyword/s</td><td>Database</td><td>Number of hits</td></tr>
<tr><td>1</td><td>Cleft Lip</td><td>Ovid MEDLINE</td><td>11152</td></tr>
<tr><td>2</td><td>Cleft Palate</td><td>Ovid MEDLINE</td><td>13920</td></tr>
<tr><td>3</td><td>1 OR 2</td><td>Ovid MEDLINE</td><td>16351</td></tr>
<tr><td>4</td><td>1 AND 2</td><td>Ovid MEDLINE</td><td>8721</td></tr>
<tr><td>5</td><td>Intravenous Fluids</td><td>Ovid MEDLINE</td><td>16582</td></tr>
<tr><td>6</td><td>3 AND 4 AND 5</td><td>Ovid MEDLINE</td><td>3</td></tr>
<tr><td>7</td><td>Articles in English language only</td><td>Ovid MEDLINE</td><td>3</td></tr>
<tr><td>8</td><td>Articles from 2012-2022</td><td>Ovid MEDLINE</td><td>3</td></tr>
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</td></tr>
<tr><td>Screening Evidence</td><td>Titles and abstracts were screened to select the relevant articles. Inclusion and exclusion criteria were applied. Articles that do not fall in such categories were excluded.

All relevant papers were reviewed and two papers were selected. Backward chaining was done to gather any additional papers worth considering in the review.</td></tr>
</table>

The main rationale behind this study is to challenge traditional practices within the United States, namely routine admission after primary cleft lip repair surgery. The aim of the study was clearly stated at the beginning with primary and secondary targets to be able to reach this aim. The authors declared no conflict of interest and obtained the necessary ethical approvals in keeping with Declaration of Helsinki regarding research ethics.

Inclusion criteria were set as in Table 5. Exclusion criteria were not specifically mentioned and may introduce risk of selection bias and inconsistency when choosing the sample.

Table 4: Aims, methods and results for Oh, et al. (2015) [15].

Aim	Methodology	Results
To identify factors relating to length of stay after primary cleft lip repair surgery. As a secondary outcome, the course of events during hospital stay was also analysed.	One hundred consecutive cases who underwent primary cleft repair between January 2008 and April 2012. A standard modified rotation-advancement Millard repair was carried out in all infants. Data collected included length of stay, time to stop intravenous fluids post operatively and time to discontinue intravenous pain medication. Duration of anaesthesia, length of surgery, type and amount of analgesia used were also considered. Information regarding admission and duration at post anaesthesia care unit was also collected as well as time to and amount of oral intake. All infants were ordered to stop intravenous fluids when adequate oral intake was taken according to Holliday-Segar calculation. Inclusion criteria were mentioned but exclusion criteria are not included in the manuscript. The authors declared no conflict of interest and obtained ethical approval from the institutional review board. Statistical analysis was carried out using t tests and linear regression analyses. p value <0.05 was considered significant.	One hundred consecutive infants with primary cleft lip repair were reviewed. No deaths or major complications were recorded. Most patients considered had primary cleft lip repair, isolated or part of a syndrome. Fifteen infants had suspected syndrome without molecular or clinical diagnosis. Overall mean length of stay was 36 hours for the cohort. Intravenous fluids were routinely given in 98% of patients. Patient were transferred to post-anaesthesia care unit with running intravenous fluids. These were stopped approximately three hours after transfer to ward, irrespective of oral intake in the first three hours post- operatively. Adequate oral intake was achieved in ninety- five patients at a mean time of 24.1 hours. Data about intravenous analgesia is also provided in the manuscript. Patient factors are also analysed in relation to length of stay and none were found to be statistically significant. Univariate analysis was carried out and results show that total intravenous fluids on the surgical ward increased length of stay with a p value or 0.02. Time to oral intake also increased length of stay with a statistically significant value of 0.009. Decreased length of stay was associated with increased postoperative oral intake at p= 0.000.

Consecutive patients through convenience sampling were selected for the study. The study is single centred and not powered hence increasing risk of Type II error and decreasing external validity.

Statistical significance was set at 5%. Tests used for analysis are mentioned but there is no explanation relating to which test was used in categorical versus non-categorical data, for example use of t test in continuous variables. Results are analysed through univariable analysis but multivariate analysis is not available. Thus, one cannot assume if results are due to significance or covariance. This leads to decreased statistical rigour. Univariate analysis for this study is displayed in Figure 5. Descriptive statistics regarding intravenous fluids are provided however the authors fail to provide graphic representation of the results.

A standard surgery is carried out in all cases within the study-modified rotation-advancement Millard repair-yet there is no mention whether the same surgeon operated all infants, level of expertise and follow up. These factors may introduce information bias. There is also a high degree of variability and decreased sensitivity of the study.

The main outcome of the study is that a day surgery for elective primary cleft lip repair is not ideal with questionable safety. This result might be due to more factors tested including patient factors hence higher chance of obtaining unfavorable factors for a day surgery. Intravenous pain medication requirements are also considered.

The authors refer to the limitations of the study by mentioning that follow up data is not documented. They also appreciate that the study has small patient numbers which limits the power of the study. They suggest that a prospective design would provide more reliable conclusions.

In conclusion, postoperative oral intake was found to correlate with shorter length of stay. However, this was not well implemented in this retrospective study with patients having longer stay due to longer intravenous fluid administration. A well-designed prospective study is suggested by the authors to confirm these results. The study may be graded as Harbour Miller 2- due to high risk of bias and confounding.

The second retrospective cohort study tackles fluid management after cleft repair surgery. Contradicting management strategies exist, hence Onyekwelu et al. [8] question Should We Give Postoperative Intravenous Fluids After Cleft Surgery? The single-centred study identifies seventy-nine patients operated by a single surgeon at Manchester Cleft Unit between August 2011 and August 2012. The study was driven by a previously conducted study between 2006 and 2008 showing that patients in Manchester had

a 30% longer length of stay partly related to a standard overnight intravenous infusion post-operatively and slower but continuous intravenous fluid regimen until regular oral feeding was restored. This was criticised and as a reaction to the study a trial of no routine fluids was carried out by the authors in 2011. The authors include the geographical location of the study so that the reader can

	Associated Factors
Increasing LOS	Duration of general anesthesia ($P = .0000$)
	Duration of surgery ($P = .0000$)
	Total IV fluids on the surgical floor ($P = .02$)
	Time to oral intake on the surgical floor ($P = .009$)
	Time to last dose of morphine on the surgical floor ($P = .0000$)
Decreasing LOS	Total intraoperative local anesthetic ($P = .007$)
	Total morphine in the PACU ($P = .02$)
	Total morphine on the surgical floor ($P = .04$)
	Total oral intake on the surgical floor ($P = .0000$)
	Total acetaminophen on the surgical floor ($P = .0000$)

Figure 2: Univariate analysis for Oh, et al. [15].

The aims of this study were well defined with clear outcomes - to identify intravenous fluid requirement, adverse events and length of stay. The key finding from this study is that routine intravenous fluids are not indicated post- operatively. None of the patients required readmission or second surgery indicating that routine fluids are not a key factor in limiting post-operative adverse events.

The aim, methods and results are summarised in Table 6.

Table 5: Inclusion criteria for Oh et al. (2015) [15].

Inclusion Criteria
Infants undergoing primary cleft lip repair surgery
Operated between January 2008 and April 2012
Syndromic and non-syndromic infants

The objective of the study is well defined since it targets the research question, hence designing the study as a direct reply to the aim. Secondary outcomes are also incorporated in the aim, making the study more structured and targeted. Data collection methods are explained. The patient's characteristics included from data collection are also mentioned in the study making the study reproducible.

Authors declared that the study is endorsed by national research review board, however they failed to mention conflicts of interest relating to the study. This reflects negatively on the study due to a higher probability of misconduct as individuals may divert resources including finances towards personal gains any may decisions for private benefits. Failure to dissociate from any conflicts of interest also implies lack of research governance and has a higher risk of reduced scientific quality. Should there be a conflict of interest in a study, then there would also be a breach of the Declaration of Helsinki [16].

The inclusion and exclusion criteria are not mentioned as definite points, resulting in decreased reliability and inconclusive results. Only general reference is made to the population included as 'All patients undergoing cleft-related surgery by the senior author in a single centre during August 2011 through August 2012'. Consecutive patients are incorporated in the study, selected by convenience sampling as the patients in a set timeframe were included. Unselected patients specifically limit selection bias.

Sample size is not adequately calculated and a power calculation is unfortunately missing. The sample size is limited due to single-centred study data covering only one year period, therefore reducing external validity and increasing risk of Type II error. Single centred studies are less expensive, small scale studies with a flexible approach to develop new treatments or put research to practice. However, the small cohort in this type of study might result in recruiting a very small population to be scientifically viable. Additionally, there is a higher risk of bias when compared to a multi centred study as investigators are from one centre only.

The authors mention a number of standardised criteria, including perioperative fluid balance, surgeon expertise and follow up by specialised nurses in all cases. This reduces the risk of observer bias.

Results were presented through text with limited graphic representation. Graphs were only used to present types of surgeries carried out and requirement of post-operative intravenous fluids in the older and younger groups of patients. Statistical analysis was set at 5% indicating that a p value lower than 0.05 would reject

the null hypothesis and accept the alternative hypothesis indicating a statistically significant result. Significant p value was obtained for older children and intravenous fluids indicating a statistically significant relationship between the two variables. The Mann-Whitney U-test is an adequate test which was used to analyse statistics.

The study fails to mention a univariate or multivariate analysis. In view of this, it is difficult to identify whether results are due to covariance or otherwise. Validity is also questionable, and the study has poor statistical rigour.

Onyekwelu et al. [8] make a comparison with length of stay and complication rate of other units, namely Oxford and Great Ormond Street Hospital. Additionally, they compare physiological reserve of children undergoing cleft surgery and adenotonsillectomy. These surgeries are compared due to similar risks of bleeding, dehydration and airway distress [17-19]. These comparisons increase transferability of information and add external validity to the study.

The study concludes that routine post-operative intravenous fluids are not indicated for a faster recovery. Instead, the authors advocate early post-operative feeding as this is associated with shorter length of stay and no adverse events. This contradicts previous study by Oh et al. [15] whereby shorter length of stay is refuted. Onyekwelu et al. [8] tackle all the aims of this retrospective cohort study. The study would be graded as 2- according to the Harbour and Miller classification as it is a small single-centred study with lack of complete statistical analysis. Further studies with a larger cohort and more centres are required to improve external validity and obtain more transferable results to be able to change existing practices.

Rangaraju et al [6] carry out post-operative intravenous fluid administration for infant cleft surgery: an observational study. The retrospective cohort study analyses one hundred and ten cleft repair surgeries at West Midlands Cleft Centre carried out between May 2015 and April 2016 in non-syndromic patients. The primary aim was to investigate intravenous fluid therapy for primary cleft surgery, time to oral feeding post operatively and length of stay in hospital.

Authors concluded that infants with cleft lip repair had the shortest length of hospital stay which was even shorter with no intravenous fluids. Cleft lip patients also started oral feeding earlier without intravenous fluids, hence indicating that routine intravenous fluids are not indicated.

The aim, methods and results are summarised in Table 7:

Table 6: Aims, method and results for Onyekwelu, et al. [8].

Aim	Methodology	Results
To identify the role of routine intravenous fluids after cleft repair surgery Primary outcomes: -Requirement of intravenous fluids post-operatively -Adverse events including need for second surgery -Length of stay Secondary outcomes: -Improve psychological drive to oral feeding -Remove physical barrier and allow earlier parent- to-child bonding -Optimise analgesia to achieve adequate oral intake in a timely manner	Seventy-nine patients, operated at Manchester Cleft Unit, were included in this single-centre retrospective cohort study. Inclusion criteria were identical foreach patient. The study was endorsed by the Central Manchester University Hospital NHS Foundation Trust/ Institutional Review Board. Conflict of interests are not excluded in the manuscript. The selected cohort subjects underwent cleft repair surgery between August 2011 and August 2012. Cleft lip was repaired at three to four months of age using a modified Millard technique while cleft palate repair was performed between eight and twelve months of age using Sommerlad intrevelar veloplasty muscle dissection technique. Surgical technique and surgeon's expertise was standardised as all operations were carried out by the same surgeon. Patients wereoptimised prior to leaving theatre and adequate fluid balance was maintained intraoperatively. Routine intravenous post- operative fluids were not prescribed and they were only stated if the child failed to start tolerating oral intake after eight hours or before going to sleep. Data was collected through patient's notes regarding age, weight, type of surgery, fluid requirement and length of stay. Patients were followed up by cleft lip and palate nurse specialists within one week following hospital discharge to assess for complications or readmissions. The Mann-Whitney U test was used to analyse independent samples.	Only nineteen of seventy-nine patients required intravenous fluids due to poor oral intake post- operatively. These were mostly older children in the group, defined as children over one year old. Mean duration of postoperative fluids was 14.58 hours. Out of the younger patients undergoing surgery only one of twenty required post-operative fluids. All patients who underwent surgery received perioperative maintenance fluids as a standard practice. Patients considered were twenty-one patients who underwent primary lip +/- anterior palate repair and twenty-five who underwent primary repair of soft +/- hard palate. Twenty-one patients underwent speech surgery for velopharyngeal insufficiency. The remaining patients underwent lip revision, delayed primary palate repair or palate re-repair. Syndromic patients required more aggressive approach to fluid management when compared to non-syndromic patients. In fact, intraoperative fluid rate was 1.4 times more than the non- syndromic group. Post-operative care was also more aggressive in the syndromic patients with ahigher requirement of intensive care on the first night post operatively. Mean length of stay in patients with no post- operative intravenous fluid requirement was 1.48 days compared with 2.47 days in patients requiring intravenous fluids. No patients required readmissions for hydration or return to theatre.

The aim of the study is defined straightaway at the beginning of the manuscript hence the study is well designed to test the hypothesis. Data collection tools were selected carefully to be able to reach the desired aims. Through stepwise instructions for data collection, the authors ensure consistency hence increasing reliability of the study. Inclusion and exclusion are set out as demonstrated in Table 8.

Table 7: Aims, method and results for Rangaraju, et al. [6].

Aim	Methodology	Results
To identify use of intravenous fluids after primary cleft surgery and assess the relationship of intravenous fluids with commencement of oral feeds and length of hospital stay.	One hundred and ten cleft surgeries were considered. These surgeries comprised non- syndromic clefts in ninety-four children operated between may 2015 and April 2016 at West Midlands Cleft Centre. All surgeries were done by three specialised surgeons. Clefts were divided in three groups – lip only, palate only (hard and soft palate), lip and palate (including lip and vomer flap). Fifteen patients in the lip only group had a palate surgery later. The authors declared no conflict of interest however no ethical approvals are mentioned. Inclusion and exclusion criteria are clearly indicated. Fluid administration for each type of surgery was documented no intravenous fluids, intravenous fluids continuing from surgery, intravenous fluids required post operatively due to poor oral intake. Sufficient fluid intake was defined as 50ml or more oral intake within four hours, including clear fluids, milk or breastfeeding for 10 or more minutes. All infants were allowed to feed normally (as preoperatively) with no restrictions. Statistical analysis was carried out using Q-Q plots, ANOVA test and post-hoc Tukey. p value <0.05 was considered significant.	Intravenous fluids were prescribed from surgery in 52 of 110 surgeries (47%), with a majority in the lip and palate group. 67% of lip only infants had no intravenous fluids administered, compared to 21% of palate only and 23% of lip and palate children. Not all infants who had prescribed fluids received intravenous fluids. Fluids which were prescribed but not administered, prescription was generally done by the surgeon rather than the anaesthetist. The median length of stay was shortest among the lip only group (26 hrs 8 min). Palate only and lip and palate patients had a longer stay (29 hrs 20 min and 2 hrs respectively). Lip only infants with no intravenous fluids had a significantly shorter length of stay (24hrs 45 min) when compared to lip only surgery with intravenous fluids (median 26 hrs 8 min). ANOVA showed that sufficient oral intake > or equal to 500ml was significantly faster for lip only compared to lip and palate infants. Infants with lip only surgery achieved oral intake of 50ml or more in less than 4 hours (72%). The palate only or lip and palate patients achieved the same result in a slightly longer timeframe (within 4 hours). Ten infants had perioperative complications namely laryngospasm, low oxygen saturation, bleeding or extravasation of intravenous fluids. No infants required second operation or hospital readmission.

Table 8: Inclusion and exclusion criteria for Rangaraju, et al. [6].

Inclusion criteria • All children aged three to eighteen months • Undergoing primary cleft repair surgery (including lip only, palate only, and both lip and palate) • Operated between May 2015 and April 2016 • Surgeries done by three cleft surgeons
Exclusion criteria • Syndromic infants • Children younger than three or older than eighteen months • Operated outside the given timeframe

The fact that both inclusion and exclusion criteria are highlighted limits risk of confounding. However, there is no mention of selection methods for the patient cohort indicating that there might be risk for selection bias. Additionally, the study lacks a power calculation with a subsequent small sample size from a single centre only hence increasing risk of Type II error. Although

being a small cohort, the study population is the largest of the three studies analysed in this review. Selection bias and absence of power calculation will provide unreliable results hence decreasing external validity of the study. The authors fail to mention method of selection of patients hence increasing risk of selection bias.

Surgeons performing the procedures were limited to three surgeons practising at the study centre maintaining consistency and standardization of practice. One of the surgeons manages post-operative fluids while the other two surgeons depend on anaesthetists to manage post-operative fluid requirements. This may introduce risk of confounding.

All patients at initial phase of the study are accounted for throughout the study. Hundred and ten operations were carried out in ninety-four patients as fifteen lip only patients required palate repair at a later stage. Later on in the study, patients are also classified with regards to fluids prescribed versus fluid administered. Again, a detailed description is given here to explain why not all patients received the prescribed fluids and which patients failed to receive this treatment. A graphic representation such as a PRSIMA chart would have helped the reader to develop a clearer picture.

Rangaraju et al. [6] declare no conflict of interest however fail to mention ethical approvals. All studies involving human or animal studies are legally bound to have informed consent and ethical approval [20] to achieve good research governance. Hence this study has poor research governance due to missing ethical approvals and implies a breach to the Declaration of Helsinki [16].

Statistical analysis was carried out using adequate statistical tests. In fact parameteric data was rightly

tested with ANOVA and post-hoc Tukey test. p value of less than 0.05 was considered significant. A univariate analysis was done and is represented in a table but no multivariate analysis was carried out, increasing risk for covariance. This poses a threat to statistical rigour and limits external validity.

Results are presented in categories namely (i) Fluid Prescription and Administration, (ii) Length of stay in hospital and (iii) Oral intake. These categories tackle the aims directly. Text and tables are presented with no graphs within the text. Figure 3 compares operative groups and fluid requirements. Length of stay and time to achieve >50ml oral intake are not related to intravenous fluids. In fact, length of stay and time to oral intake in patients who received intravenous fluids were not found to be statistically significant in relation to surgery with p values >0.05 as shown in Figure 1.

	Total Operations	Only Lip Surgery	Lip & Palate Surgery	Only Palate surgery	ANOVA p value (between surgery groups)
Total Operations	110	33% (36)	15% (17)	52% (57)	
Length of Stay (hours)	27.2	25.1*	29§	29.3	0.000
Time to achieve >50mL oral intake (hours)	4.5	3*	4.8	6.3	0.001
No IV fluids n=	40	67% (24)	24% (4)	21% (12)	
LOS	25**	24.8*	26.3	26.4	0.010
TOI	1.3**	1.2**	0.6	1.8**	0.35
Continued IV fluids n=	52	28% (10)	47% (8)	60% (34)	
LOS	29.4	26.1	33.9§	29.8	0.016
TOI	6.8	5	4.9	8.3	0.181
Requiring IV fluids n=	18	5.5% (2)	29% (5)	19% (11)	
LOS	28.5¤	39¤	28	30	0.87
TOI	6.9¤	5.3	7.1	6.8	0.758
ANOVA p value LOS (between fluid requirement)	0.001	0.014	0.57	0.176	
(ANOVA p value TOI	0.000	0.009	0.21	0.003	

LOS: Length of stay (hours), TOI: time to achieve >50mL oral intake (hours).

Figure 3: Univariate analysis between operative groups and IV fluid requirement.

The authors list the limitations of the study namely a small sample of hundred and ten surgeries. Group sizes were noted to be smaller when split into different surgery groups. The study also fails to identify complete versus incomplete cleft palates. Additionally, there is no distinction between palate surgeries requiring or not requiring release of incision.

The study concludes that routine post-operative fluids are not indicated but should only be given in cases of poor oral intake. Infants who received no post-operative intravenous fluids were discharged earlier from hospital. This can be seen more clearly in lip only infants. Some patients with cleft repair required intravenous fluids to maintain hydration and further studies are necessary to make any recommendations regarding cleft palates.

Conclusion

Data relating to routine post-operative fluids after cleft lip or palate repair is inconclusive. In fact, within the three studies considered two studies advocate for no routine intravenous fluids [6,8] while Oh et al.

[15] stick to more conservative treatment with routine post-operative intravenous fluids. this controversy, all studies agree that early oral intake leads to shorter length of stay, hence enhanced recovery. Thus, as a reply to the aim, all studies infer that routine post operative intravenous fluids do not provide a clear-cut additional benefit to cleft lip and palate repair surgeries.

Intravenous fluids were found to increase length of stay unnecessarily. Hence Onyekwelu et al. [8] and Rangaraju et al. [6] promote early oral feeding and intravenous fluids only in case of insufficient feeding.

It must be appreciated that all three studies were graded 2- according to Harbour and Miller [14] classification meaning that all have a high risk of confounding or bias. Unfortunately, this might be due to all three studies being non-powered with a risk of Type II error, possibly due to small cohorts and single- centred data. These limitations are common to the studied literature. In view of this, more rigorously conducted studies are required with greater sample size from a multi-centred cohort.

In conclusion, the future points to elective cleft lip and palate day surgery with no routine intravenous fluids and early oral intake. However, only limited data is available to date as indicated in the search strategy and further studies are required.

Acknowledgement

None.

Conflict of Interest

No conflict of interest.

Reference

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