



## Comparison of Surgical Outcomes Using Millard's Advancement Rotation technique and Fisher's anatomical subunit repair techniques for Unilateral Cleft Lip Repair- A Systematic Review

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### ABSTRACT

**Background:** Cleft lip is a common congenital deformity that requires surgical intervention to restore both function and aesthetics. Various techniques have been developed for cleft lip repair, with Millard's Rotation Advancement Technique and Fisher's Anatomical Subunit Repair Technique being widely used. The choice of technique can significantly impact surgical outcomes, including aesthetics, function, and complication rates. This systematic review aims to compare the efficacy, aesthetic outcomes, and complication profiles of these two techniques.

**Objectives:** To systematically evaluate and compare the surgical outcomes of Millard's Rotation Advancement Technique and Fisher's Anatomical Subunit Repair Technique for unilateral cleft lip repair. The systematic review focuses on post-operative aesthetic outcomes and complication rates.

**Methods:** A systematic literature search was conducted using databases such as PubMed, Google scholar, Cochrane Library, web of science and Scopus. Studies comparing the surgical outcomes of Millard's and Fisher's techniques were included. Eligible studies were randomized controlled trials (RCTs), cohort studies, and retrospective analyses. The PRISMA guidelines were followed for the review process. Data were extracted on aesthetic outcomes (lip and nasal symmetry), and complication rates (scarring, wound dehiscence, and nasal deformities) and patient satisfaction. Risk of bias was assessed using the Cochrane Risk of Bias Tool and the level of evidence was rated according to the Oxford Centre for Evidence-Based Medicine guidelines.

**Results:** A database search yielded a total of 4 articles of which 2 articles were excluded and 2 studies met the inclusion criteria and were included in this systematic review. The review demonstrated that Fisher's Anatomical Subunit Repair Technique consistently

provided superior aesthetic outcomes and showed fewer instances of noticeable scarring and better lip contouring. Millard's Rotation Advancement Technique, while effective in restoring lip continuity and function, showed higher rates of nasal asymmetry and scarring. However, it was noted for its flexibility in adapting to different cleft morphologies. Complication rates (wound dehiscence, infection) were slightly lower in patients treated with Fisher's technique, though differences were not statistically significant.

**Conclusion:** Fisher's Anatomical Subunit Repair Technique provides more favourable aesthetic outcomes and reduces visible scarring compared to Millard's Rotation Advancement Technique in the repair of unilateral cleft lip. Though Fisher's technique may offer advantages in reducing complication rates, surgical choice

should be based on the specific characteristics of the cleft, surgeon experience, and patient priorities regarding aesthetics and functionality.

**KEYWORDS:** Cleft lip repair, Millard's Rotation Advancement Technique, Fisher's Anatomical Subunit Repair Technique, Unilateral cleft lip, Aesthetic outcomes, Complication rates, Systematic review.

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### INTRODUCTION

Cleft lip is a congenital abnormality that arises from incomplete fusion of the upper lip tissues during foetal development, leaving a gap or cleft in the lip. This disorder can manifest as anything from tiny lip notch to a significant split that reaches into the nose. A cleft lip can impede speech, eating, and dental development in addition to impairing the facial look. It frequently coexists with a cleft palate. The goal of cleft lip repair is to restore both appearance and function, usually during the first year of life.

The embryology of cleft lip revolves around the complex developmental processes of the face during early foetal life. A cleft lip occurs due to a failure in the fusion of facial structures, which typically happens during the 4th to 7th week of

gestation. Understanding the basic embryological mechanisms behind cleft lip helps in diagnosing, managing, and treating this condition.

Between the 4th and 6th weeks of gestation, critical events in lip development occur. The upper lip is formed by the fusion of the medial nasal prominences and the maxillary prominences on either

side of the face. The medial nasal prominences contribute to the formation of the philtrum (the central part of the upper lip), while the maxillary prominences give rise to the lateral portions of the upper lip.

Fusion of these prominences is a coordinated event that requires cell proliferation, migration, and adhesion. During normal development, these tissues grow toward each other, fuse, and form a continuous upper lip. If this process is disrupted at any stage—due to genetic, environmental, or unknown factors—it can result in a cleft lip.

Over time, various surgical techniques have been developed to correct cleft lips. Two of the most prominent methods are Millard's Rotation-Advancement Technique and the Fisher Anatomical Subunit Approximation Technique.

First introduced in 1957 by Dr. D. Ralph Millard, the Rotation Advancement Technique is one of the most commonly used methods for unilateral cleft lip repair. This technique is based on the principle of rotating the medial lip element and advancing the lateral lip element to achieve closure. It allows for flexible design and adjustment based on the individual cleft, and it aims to reconstruct the philtrum and achieve symmetry. This technique is known for its versatility in adapting to different cleft configurations, though it may sometimes lead to aesthetic challenges, particularly in terms of scar appearance or nasal symmetry.

The Fisher Anatomical Subunit Approximation Technique, developed more recently, focuses on the concept of aligning the natural anatomical subunits of the lip. This technique emphasizes precise reconstruction of the different anatomical zones of the lip to

enhance symmetry and minimize scarring. By respecting the natural landmarks of the face, the Fisher technique is designed to achieve a more natural lip shape and improve aesthetic outcomes, particularly in the nasal region. Surgeons performing this method aim to restore the normal lip contour by carefully aligning the muscles and soft tissues of the lip and nose.

Both techniques have their advantages and limitations, with Millard's method offering flexibility and Fisher's approach aiming for more precise anatomical reconstruction. The choice between these techniques often depends on the surgeon's preference, the patient's specific anatomy, and the desired aesthetic and functional outcomes.

This systematic review aims to compare the outcomes of Millard's Advancement Rotation technique and Fisher's anatomical subunit repair techniques for Unilateral Cleft Lip Repair focusing on their aesthetic outcomes and post operative complication rates.

## AIM

The aim of this systematic review was to analyse existing literature to assess surgical outcomes between Millard's Advancement Rotation technique and Fisher's anatomical subunit repair techniques for Unilateral Cleft Lip Repair.

## STRUCTURED QUESTION

Are there any differences in surgical outcomes between Millard's rotational advancement technique and Fischer's technique for unilateral cleft lip repair?

## PICO ANALYSIS

**P-** Participants - patients with unilateral cleft lip undergoing surgical repair

**I-** Intervention - Fischer anatomical subunit approximation technique

**C-** Comparison - Millard's rotational advancement technique

**O-** Outcome- lip and nasal aesthetics, post operative complications.

## MATERIALS AND METHODS

A comprehensive literature search was conducted using the following electronic databases: Web of Science (Figure 1), Scopus (Figure 2), Cochrane (Figure 3), Google Scholar (Figure 4) and PubMed (Figure 5) . Articles were filtered based on their focus on cleft lip repair and comparative outcomes between the two surgical techniques. The search strategy included use of key words, MeSH (Medical Subject Headings) and Boolean operators "AND" and "OR" for each database.

Inclusion criteria:

- patients with unilateral cleft lip undergoing surgical repair
- Non syndromic patients
- Studies assessing Millard's rotational advancement technique
- Studies assessing Fischer's anatomical subunit approximation technique

Exclusion criteria:

- patients with bilateral cleft lip undergoing surgical repair -syndromic cleft lip patients

-patients undergoing cleft palate repair  
- publications in languages other than English  
-case reports, case series, reviews.

The systematic review was registered on PROSPERO with ID number CRD420250652710.

## RESULTS

Out of the 572 articles screened from databases, 2 were included based on the core data (Table 1). The two articles were reviewed, and were consolidated to perform systematic review as depicted in Figure 6 . The extracted studies were analysed for risk of bias as depicted in Table 2.

## DISCUSSION

Cleft lip, a common congenital malformation, affects not only aesthetic appearance but also functional aspects such as feeding and speech. Effective surgical repair is crucial for improving both the appearance and function of the lip and associated structures. Among the various techniques available for cleft lip repair, Millard's Rotation Advancement Technique and Fisher's Anatomical Subunit Approximation Technique stand out for their respective approaches and outcomes.

Millard's Rotation Advancement Technique is highly adaptable to varying cleft morphologies, allowing surgeons to tailor the approach based on individual anatomical considerations (1)(2). Effective philtral reconstruction as the design focuses on recreating the natural anatomy of the lip, particularly the philtrum, which is crucial for aesthetic outcomes (3). Several studies have established effective restoration of lip and nasal symmetry, leading to satisfactory aesthetic outcomes (4,5).

However visible scarring is one of the significant concerns associated with the Millard technique. While surgeons attempt to minimise scar visibility, patients may still experience prominent scars post-operatively (6). If not performed with precision, this technique may lead to nasal deformities, especially if the lateral nasal components are not adequately addressed (7).

The Fisher Anatomical Subunit Approximation Technique, lays emphasis on the anatomical subunits of the lip and face during the repair process. This technique focuses on the preservation of natural lip contour and alignment of the anatomical landmarks, which can lead to improved aesthetic results (8). By prioritising the alignment of anatomical subunits, Fisher's technique often results in improved aesthetic outcomes, particularly in the nasal region. Several studies have reported high satisfaction rates with the cosmetic results achieved through this method (9,10). Fisher's technique also aims to reduce scarring by utilising the natural lines of facial anatomy for incisions, potentially leading to more inconspicuous scars (11). Like Millard's technique, Fisher's approach also focuses on restoring functional outcomes, including lip mobility and nasal function, which are essential for feeding and speech (12)

The Fisher technique may, however, require a higher level of skill and experience, as it involves a more detailed understanding of facial anatomy (13). This can prove to be a challenge for less experienced surgeons. Surgical times may also be longer compared to certain simpler methods (14).

Several studies have compared the effectiveness of these two techniques. Hoffman et al. (2011) and El Maghraby et al. (2021) both highlighted differences in aesthetic outcomes, complication rates, and patient satisfaction between the two methods. Hoffman et al. found that while both techniques offered satisfactory results, the Fisher technique generally yielded better aesthetic outcomes and lower complication rates (15). In contrast, El Maghraby et al. noted that while Millard's technique provided good functional results, it was sometimes associated with greater scarring and nasal deformity compared to Fisher's approach (16). (Table 3)

## CONCLUSION

There were small difference between the techniques in terms of aesthetics favouring Fisher's technique. There are no scars in the nares, allowing for an improved nasal form with the Fisher technique compared to the rotation advancement flap. In the other areas of evaluation of the closure, there were no significant differences, although the Fisher technique appeared to have an overall more pleasing appearance.

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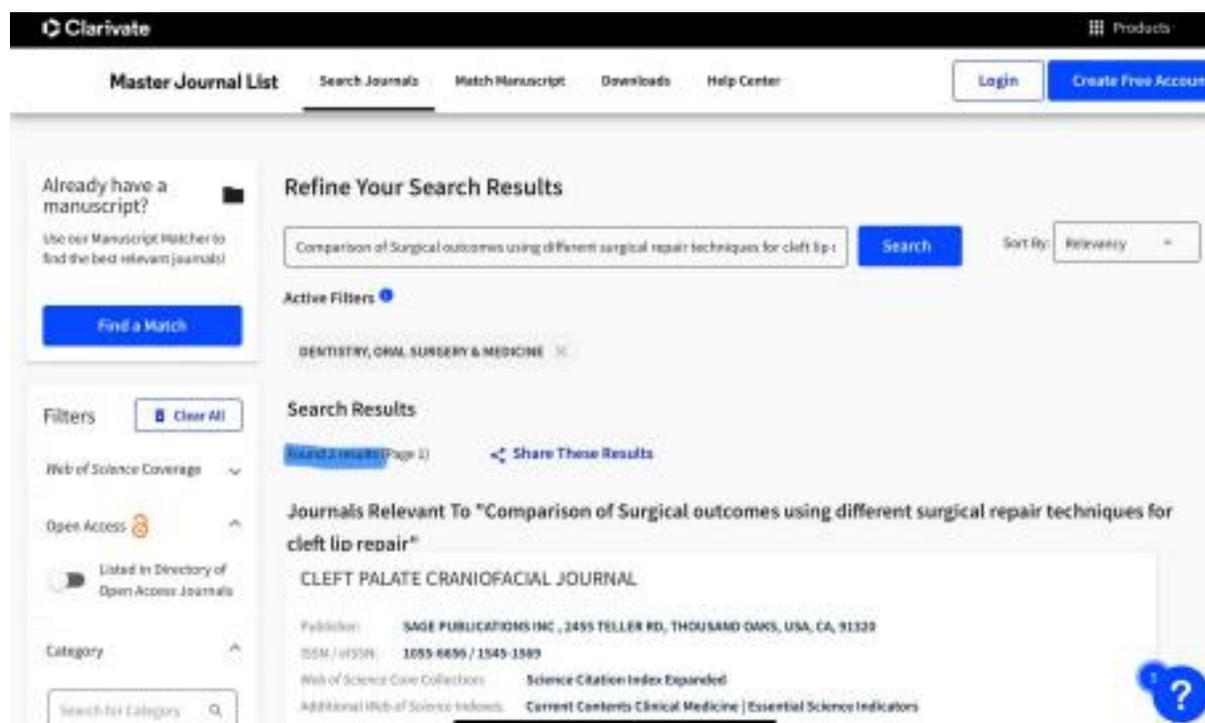


Figure 1: Web of science search results



Figure 2: Scopus Search results

The screenshot shows the Cochrane Library Advanced Search page. At the top, there is a navigation bar with 'Cochrane Reviews', 'Searching for trials', 'Clinical Answers', 'About', and 'Help'. Below this is the 'Advanced Search' section with tabs for 'Search', 'Search manager', 'Medical terms (MeSH)', and 'PICO search'. A search box contains the text 'Comparison of different surgical repair techniques for unilateral cleft lip'. Below the search box, there are buttons for 'Save search', 'View saved searches', and 'Search help'. A message states: 'Did you know you can now select fields from Search manager using the [S] button (next to the search box)? Search manager lets you add unlimited search lines, view results per line and access the MeSH browser using the new [MeSH] button.' Below this, there is a 'Filter your results' section with a table showing the number of results for different categories: Cochrane Reviews (0), Cochrane Protocols (0), Trials (12), Editorials (0), Special Collections (0), Clinical Answers (0), and More. A dropdown menu is open for 'Trials', showing '12 Trials matching Comparison of different surgical repair techniques for unilateral cleft lip in Title Abstract Keyword - (Word variations have been searched)'. Below the table, there are buttons for 'Search limits', 'Send to search manager', and 'Run search'. A 'Clear all' button is also present.

Figure 3: Cochrane search results

The screenshot shows Google Scholar search results for the query 'Comparison of Surgical Outcomes Using Millard's Advancement'. The search results are displayed in a list format. The first result is 'Comparison of the Fisher anatomical subunit and modified Millard rotation-advancement cleft lip repairs' by TA Patel, KG Patel, published in 'Plastic and reconstructive surgery' in 2019. The second result is 'Comparative study between fisher anatomical subunit approximation technique and millard rotation-advancement technique in unilateral cleft lip repair' by MF ElMaghraby, NA Ghossein, M ElAshry, published in 'Alexandria Journal of ...' in 2021. The third result is 'COMPARISON OF ROTATION-ADVANCEMENT AND STRAIGHT-LINE METHODS FOR REPAIRING OF UNILATERAL CLEFT LIP (A RANDOMIZED CONTROLLED ...)' by NH Elprnce, AAF Khalil, A D Saadani, published in 'Alexandria Dental Journal' in 2002. The fourth result is 'Aesthetic outcome comparison between Millard and Fisher technique for cleft lip surgery: a literature review' by ... published in ... The search results are filtered by 'Articles' and show 'About 679 results (3.04 sec)'. There are filters on the left for 'Any time', 'Sort by relevance', 'Any type', and 'Create alert'.

Figure 4: Google scholar search results

The image shows a screenshot of the PubMed website search results. At the top, the PubMed logo is visible. Below it is a search bar containing the query: "(outcomes) AND (different methods) AND (symmetry) AND (lip length)". To the right of the search bar is a "Search" button. Below the search bar are links for "Advanced", "Create alert", "Create RSS", and "User Guide".

Below the search bar, there are filters and sorting options. On the left, there is a "Filters (4)" button and a "Timeline" button. In the center, there is a "Sort by:" dropdown menu set to "Best match". To the right, there is a "Display options" gear icon. Below these are "Save", "Email", and "Send to" buttons.

The search results are displayed on page 1 of 1. A green banner indicates that filters are applied: "Clinical Trial, Meta-Analysis, Randomized Controlled Trial, Systematic Review." with a "Clear all" link.

Three search results are listed:

- 1**  **Nasal symmetry after different techniques of primary lip repair for unilateral complete cleft lip with or without cleft of the alveolus and palate: A systematic review.**  
Sarnal A, Reddy SG, Chug A, Markus AJ, Kuipers-Jagtman AM.  
J Craniofac Surg. 2022 Dec;50(12):894-909. doi: 10.1016/j.jcms.2022.12.006. Epub 2023 Jan 5.  
PMID: 36635151 Review.  
The aim of this systematic review was to establish the effect of different surgical repairs for the lip on nasal symmetry. PubMed, Scopus, Embase, Cochrane CENTRAL, and Ovid databases search was performed initially for only English-language arti ...
- 2**  **Evaluation of Vermilion Symmetry and Scar Quality in Unilateral Cleft Lip Repair Using Modified Millard's Technique Versus Fisher's Technique.**  
Alwadei MS, Aboulhassan MA, Al-Aroomy L, Othman AA, Shindy M, Baz S.  
J Oral Maxillofac Surg. 2024 Aug;82(8):944-952. doi: 10.1016/j.joms.2024.04.006. Epub 2024 Apr 16.  
PMID: 38897214 Clinical Trial.  
BACKGROUND: Since the primary goal of cleft lip repair is to achieve a symmetrical, aesthetic lip, several surgical techniques have been utilized. ...CONCLUSION AND RELEVANCE: This study found no statistically significant differences in v ...
- 3**  **Comparison of three incisions to repair complete unilateral cleft lip.**  
Gosla Reddy S, Reddy RR, Bronkhorst EM, Prasad R, Kuipers Jagtman AM, Bergé S.  
Plast Reconstr Surg. 2010 Apr;125(4):1208-1216. doi: 10.1097/PRS.0b013e3181d45143.

Figure 5: PubMed search results

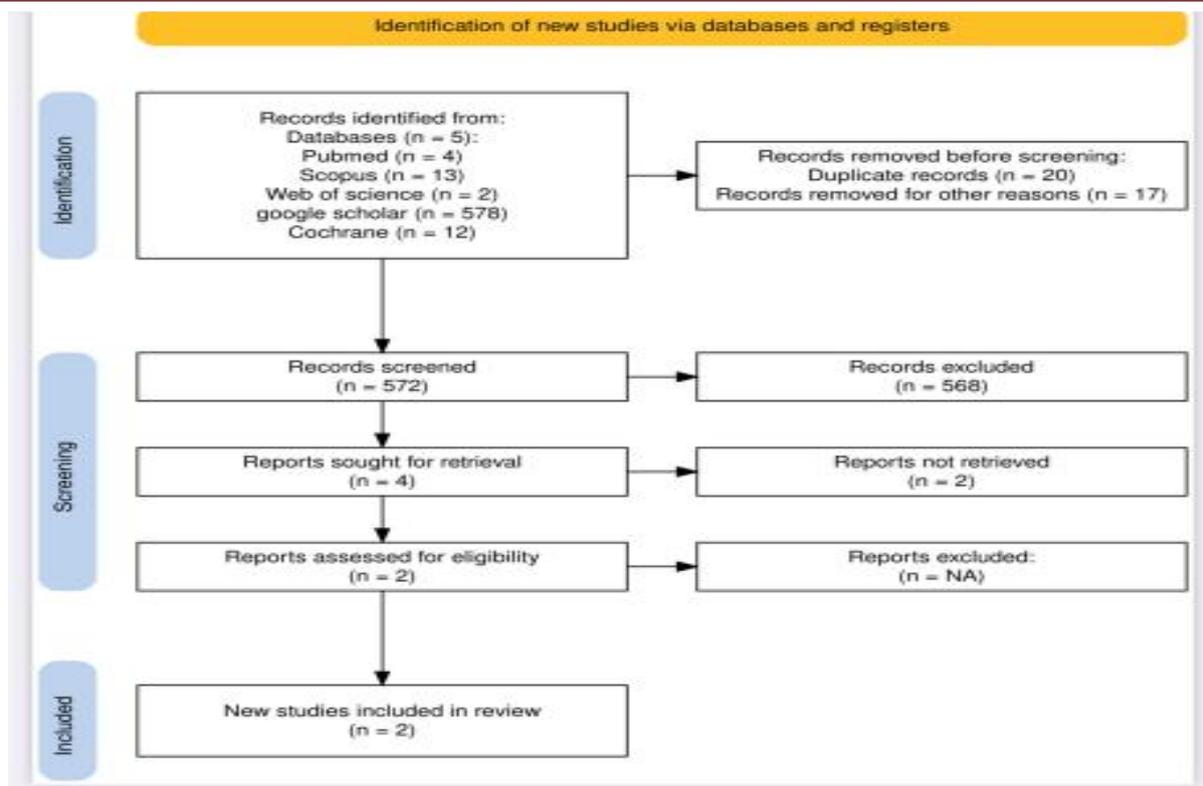


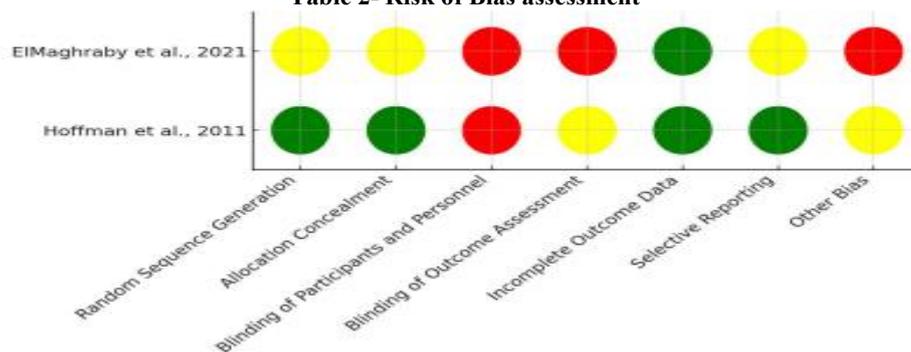
Figure 6: PRISMA Flowchart

| Study                   | Study design                | Level of evidence | Sample size | Blinding     | Risk of bias |
|-------------------------|-----------------------------|-------------------|-------------|--------------|--------------|
| Hoffman et al., 2011    | Randomised controlled trial | Level II          | 40          | Not reported | Low          |
| ElMaghraby et al., 2021 | Retrospective cohort study  | Level III         | 40          | Not reported | Low          |

Table 1: Study character

| Study                  | Selection Bias | Performance Bias | Detection Bias | Attrition Bias | Incomplete data bias | Reporting bias | Overall bias |
|------------------------|----------------|------------------|----------------|----------------|----------------------|----------------|--------------|
| Hoffman et al, 2019    | Low            | High             | Unclear        | Low            | Low                  | Low            | Low          |
| El Maghraby et al 2021 | Unclear        | High             | High           | low            | Low                  | Low            | High         |

**Table 2- Risk of Bias assessment**



| Study                           | Participants  | Intervention                                      | Comparison                             | Outcomes  | Follow up | Study design                |
|---------------------------------|---|---|--|---|-----------|-----------------------------|
| <b>Hoffman et al.,2011</b>      | 40 patients with unilateral cleft lip, aged 3-12 months | Fisher Anatomical subunit approximation technique | Millard Rotation Advancement Technique | Aesthetic outcomes (lip and nasal symmetry, scar appearance);<br>Complication rates;<br>Functional outcomes (lip movement, speech)                    | 36 months | Randomised Controlled Trial |
| <b>EIMaghra by et al., 2021</b> | 40 patients with unilateral cleft lip, aged 3-12 months | Fisher Anatomical subunit approximation technique | Millard Rotation Advancement Technique | Aesthetic outcomes (lip and nasal symmetry, scar quality); post operative<br>Complication rates( wound dehiscence, infection);<br>parent satisfaction | 24 months | Retrospective cohort        |