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The five-step medial epicanthoplasty: simple and standardized

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Abstract

Background Epicanthus refers to the longitudinal curved skin folds that cover the medial canthus, which affect aesthetics due to covering the medial canthus angle and lacrimal mound. Various surgical methods exist for correcting epicanthus, each with its own set of advantages and disadvantages, and lacking a standardized operational protocol, making it difficult for beginners to master and for clinical promotion.This article aims to explore a standardized and simplified five-step procedure for treating epicanthus and report our clinical experience and effectiveness.

Methods A retrospective analysis was conducted from October 2019 to September 2022 at the Burn and Plastic Surgery Department of the Second Affiliated Hospital of South China University. A consistent team of doctors utilized a five-step method to correct the medial canthus in 306 patients with epicanthus. All patients were followed up for more than 6 months. We observed 306 patients and used iris diameter as a reference value to subjectively evaluate the clinical effect through photo evaluation and scar scoring.Objective evaluation of clinical efficacy was achieved through the inter canthal distance (ICD) and palpebral fissure length (PFL).

Results The study included 295 females and 11 males, with an average follow-up time of 14.2 months.The average increase rate of PFL is 14.9%, and the average reduction rate of ICD is 8.6%. Two cases of bleeding and swelling were promptly treated, and no long-term complications were left. 85 cases of scar hyperplasia were treated with KELOCOTE® silicone gel, triamcinolone injection, and appropriate laser therapy in combination, and the scars gradually resolved after 12 months. 4 cases of recurrence and 2 cases of asymmetry underwent reoperation. Observing the satisfaction and effectiveness rate of 306 patients, the overall satisfaction and effectiveness rate reached over 95%. About 96.40% of patients were satisfied with the surgery and would recommend it to their family and friends. The paired t-test was used for statistical analysis, and the results showed statistical significance.

Conclusions The five-step method for correcting epicanthus proves to be a simple, efficient, and reliable technique that is easily mastered by beginners. It boasts high patient satisfaction and carries a low risk of scar formation.

Keywords Epicanthic folds, Five-Step, Standardization, Simplified

Congenital epicanthus exhibits a high incidence rate among the Asian population, estimated at approximately 50% in the overall Asian demographic and exceeding 70% in individuals with a single eyelid [1]. Multiple factors contribute to the development of epicanthus, which can be summarized as follows:1.Skin factors: These include underdevelopment of the nasal base, an excess of horizontal skin on the medial canthus, and insufficient vertical skin. The vertical skin tension surpasses horizontal tension, and differences in thickness between eyelid and

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nasal base skin also play a role [2]. 2. Orbicularis Oculi Muscle Factor:The fibers of the orbicularis oculi muscle, originating before the orbital septum, are obliquely inserted into and extend around the epicanthus.This oblique extension induces vertical tension in the muscles, representing a crucial factor in epicanthus formation [3, 4]. 3. Factors related to the medial canthal ligament: Excessive relaxation of the medial canthal ligament, along with an abnormal distribution of fibers and dense connective tissue beneath the medial canthal ligament, are considered contributors to the formation of epicanthus [5–7].

Based on these anatomical theories, various methods have been proposed to address epicanthus, such as Park's [8] modified Z-shaped epicanthus correction surgery, Kao et al.'s [9] modified Y-V advancement skin flap epicanthus correction surgery, and Oh et al.'s [10] skin resurfacing technique epicanthus correction surgery. Currently, there are multiple surgical approaches available for treating epicanthus, and clinical practitioners often select a method based on their individual preferences and experience. However, each technique comes with its own set of advantages and disadvantages, and the procedures lack standardization..

In light of this, we advocate for a five-step method to correct epicanthus. We aim to retrospectively evaluate the corrective outcomes and assess the scarring situations in a cohort of 306 patients.

Patients and methods

This study was approved by the Human Ethics Committee of The Second Affiliated Hospital of University of South China, and adhered to the principles of the Helsinki Declaration. Medical records, photographic data, and scar scores were collected from 306 patients diagnosed with congenital epicanthus during the specified follow-up period. Among the subjects, there were 295 female cases and 11 male cases. Specifically, 189 cases presented with severe epicanthic folds, and 117 cases had moderate epicanthic folds. A total of 268 patients underwent combined epicanthoplasty and blepharoplasty, whereas 38 patients received epicanthoplasty alone. All patients underwent epicanthus correction surgery at the Burn and Plastic Surgery Department of the Second Affiliated Hospital of South China University from October 2019 to September 2022. Additionally, all patients underwent photographic follow-ups and had their scars assessed at 1 month, 3 months, and 6 months post-surgery. Informed verbal consent was obtained from all patients involved in this study.

The inclusion criteria encompassed patients meeting the following conditions: (1) patients who underwent the standard five-step epicanthus correction surgery to address epicanthus, (2) patients who exclusively received epicanthus correction surgery or underwent both epicanthus correction surgery and double eyelid reconstruction in a single surgical session; (3) individuals who completed a minimum of 6 months of follow-up and provided comprehensive photographic data and scar assessment.

Exclusions were applied to patients presenting with: (1) inverted epicanthus; (2) mild epicanthic folds (3)ptosis, entropion, ectropion, or any other eye-related conditions; (4) epicanthus attributed to trauma or iatrogenic injury; (5) those who underwent facial surgeries unrelated to epicanthus during the 6-month follow-up period (6) Patients who did not complete photographic follow-up and scar assessment within 1 month, 3 months, and 6 months after surgery.

Surgical method

Step 1: preoperative design

The patient is positioned in a supine posture, and the design line marked with methylene blue. Initially, identify the optimal location for the new epicanthus (designated as point A) and mark it as the projection point of point A 'exposed when the skin is slightly stretched towards the nose (point A' is the original position of the medial canthus angle). Point B is situated on the free edge of the epicanthus on the upper eyelid (the starting point of the epicanthus), while Point C is the extension point of the B-A 'line connecting two points. The length of the AB arm is approximately equivalent to the length of the BC arm (Fig. 1).

Step 2: adequate subcutaneous separation

Utilize a No.11 blade to incise the skin along the AB and BC lines; employ sharp scissors to carefully dissect and elevate the flap ABC, creating a separation zone measuring approximately 10mm in length and 8mm in width, forming a 270° circular configuration. Trim the attachment of the anterior orbicularis oculi muscle to the medial canthus skin, thereby fully releasing the dense connective tissue between the skin and the orbicularis oculi muscle (Fig. 2).

Step 3: skeletonization of the medial canthal ligament surface

Following the complete release of subcutaneous tissue, excise the subcutaneous fibrous connective tissue which attached above the medial canthal ligament. Ensure full release of the heterogeneous and misaligned orbicularis oculi muscle, sever the fibers between the orbicularis oculi muscle and the medial canthal epicanthus, and fully expose the superficial surface of the medial canthal ligament. At this point, the fully revealed white medial canthal ligament becomes

visible, extending horizontally from the medial canthal angle to the deep fascia of the nasal dorsum.This step is crucial for alleviating tension in both the vertical and horizontal directions of the medial canthus (Fig. 3).

Step 4: alleviate tension in the medial canthal ligament

Following the complete exposure of the medial canthal ligament, employ a 6–0 PDS thread to execute a zigzag suture on the medial canthal ligament, ensuring comprehensive tension reduction. Concurrently,consider suspending the subcutaneous tissue of the nasal skin or the

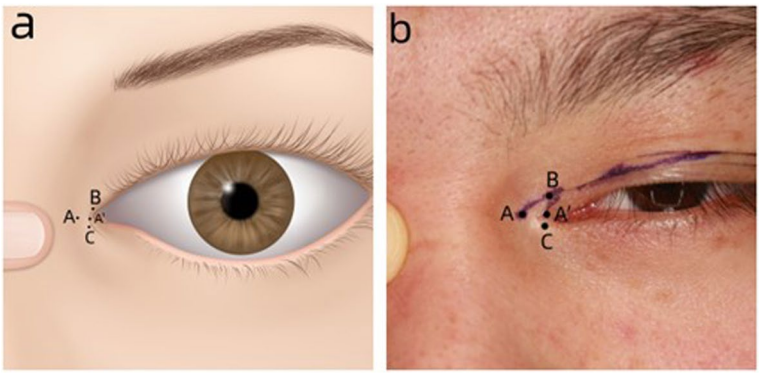

Fig. 1 Preoperative design: Point A is the ideal position for the new medial canthus angle. Point B is the intersection point between the free edge of the medial canthus skin and the upper eyelid skin. Point C is the extension point of the B-A 'line connecting the two points

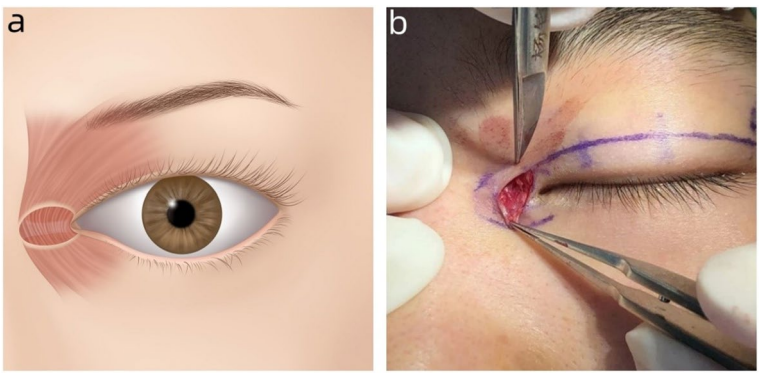

Fig. 2 Lift the skin flap for subcutaneous separation, exposing the orbicularis oculi muscle attached to the superficial surface of the medial canthal ligament

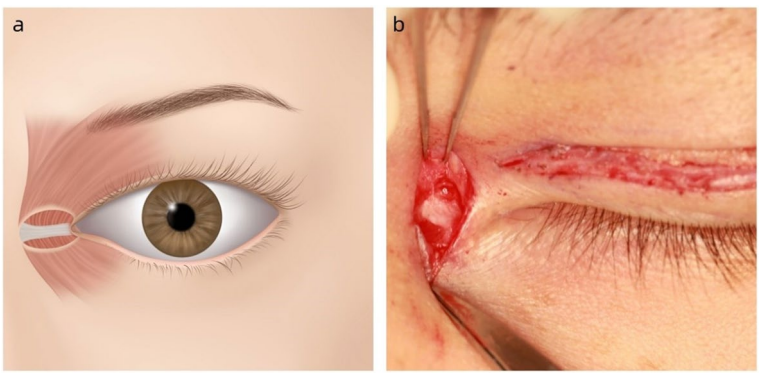

Fig. 3 Separation of the superficial orbicularis oculi muscle of the medial canthal ligament, resulting in a " skeletonization " appearance on the surface of the medial canthal ligament

deep fascia of the nasal back to enhance skin fitting and achieve sufficient tension reduction.

Step 5: skin management

Following the tension adjustment in the medial canthus region, smooth out the skin flap, delineate excess skin with methylene blue, and meticulously excise it. Employ a 6–0 absorbable suture for subcutaneous tension reduction, and utilize a 7–0 fast-absorbable collagen suture for skin closure. Postoperatively, cover the medial canthus with gauze. Implement ice compresses for the initial postoperative period. Subsequent to the surgery, replace the wound dressing on the second day.

Evaluation criteria

Changes in the distance between medial canthus and eye fissures

In collaboration with the Department of Computer Science at Hengyang Normal University, we developed a specialized computer software program for the quantitative assessment of surgical outcomes. The clinical outcomes were objectively evaluated through the intercanthal distance (ICD), palpebral fissure length (PFL), medial canthal angle, and canthal tilt angle. Specifically, the intercanthal distance (ICD) is defined as the distance between the two medial canthi. The palpebral fissure length (PFL) is calculated as 1/2 (the PFL of the left eye + the PFL of the right eye). The medial canthal angle refers to the angle formed by a line connecting the medial canthus and the upper eyelid margin and a horizontal line passing through the medial canthus. The canthal tilt angle is defined as the angle formed by a line connecting the medial and lateral canthi and a horizontal line passing through the medial canthus (Fig. 4).

Incidence of complications

Follow up the incidence of complications in patients 1 month, 3 months, and 6 months after surgery, including bleeding, swelling, scar hyperplasia, recurrence, and bilateral asymmetry.

Patient satisfaction and effectiveness

The subjective satisfaction of patients was evaluated through a questionnaire survey. The objective clinical effects were assessed by measuring the intercanthal distance (ICD) and palpebral fissure length (PFL) using computer software. The surgical outcomes and scar scores were further evaluated by 3 blinded, independent specialists in plastic surgery. The evaluation criteria were: significant improvement: significant reduction in the distance between the medial canthus, significant increase in eye fissures, absence of epicanthus, no serious

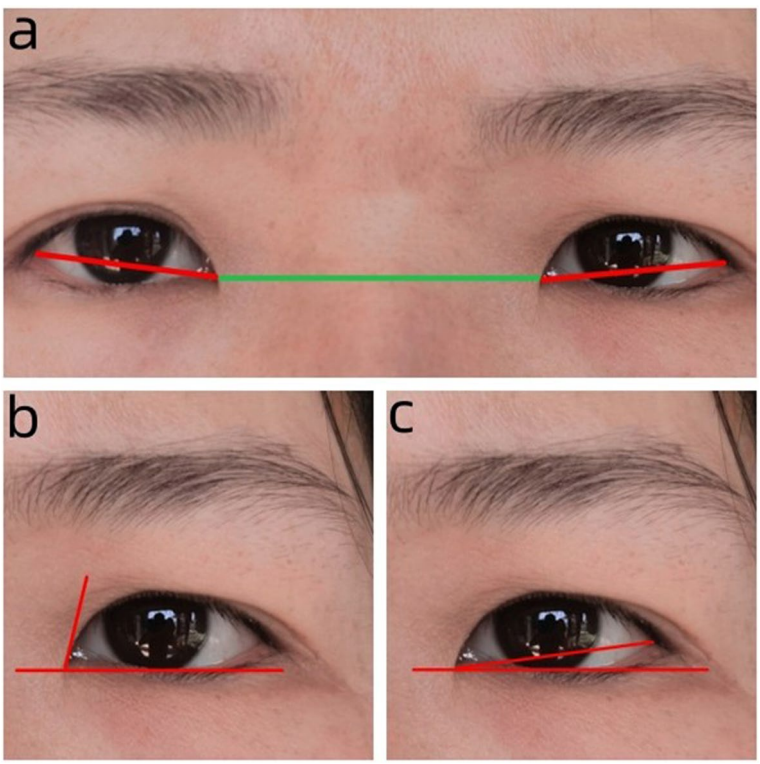

Fig. 4 **a** Intercanthal distance and palpebral fissure length. **b** Medial canthal angle. **c** Canthal tilt angle

complications during or after the surgery, and relatively hidden scars; Effective: The distance between the medial canthus is reduced, the eye fissure is enlarged, the epicanthus is significantly improved, and there are no serious complications during or after surgery, but scars are visible; Ineffective: There is no significant reduction in the distance between the medial canthus, the eye crack increases, and there is no significant change in the epicanthus. Severe complications occur during or after surgery, and the surgical scar is obvious. If any condition is met, it is considered ineffective. Total effective rate = (significant + effective)/total number of cases × 100%.

Statistical method

SPSS 13.0 statistical software was used for analysis, and t-tests were performed on the quantitative data (medial canthus distance, eyelid crack length, eye crack angle, and medial canthus inclination), with $P < 0.05$ indicating statistical significance.

Results

Changes in the distance between medial canthus and eye fissures

Observe the distance between the medial canthus, the length of the eyelid fissure, the angle and inclination of the eye fissure before and immediately after surgery, and at 1, 3, and 6 months after surgery. At 6 months after surgery, the distance between the medial canthus and the length of the eyelid creases in the patient improved significantly ($P < 0.05$), and no significant retraction was observed. At the same time, the angle of the eyelid creases and the inclination of the medial canthus decreased compared to before surgery ($P < 0.05$).(Table 1).

Incidence of complications

Observing the incidence of postoperative complications in 306 patients, the statistics are as follows: 2 cases of hematoma and swelling were treated in a timely manner, and no long-term complications were left. 85 cases of scar hyperplasia were treated with KELO-COTE® silicone gel, triamcinolone injection, and appropriate laser therapy in combination, and the scars gradually resolved after 12 months. 2 cases of recurrence and 4 cases of asymmetry underwent reoperation (Table 2).

Patient satisfaction and effectiveness

Observing the satisfaction and effectiveness rate of 306 patients, the overall satisfaction and effectiveness rate reached over 95%. About 96.40% of patients were satisfied with the surgery and would recommend it to their family and friends. (Table 3).

Case1: A 23-year-old woman underwent epicanthoplasty and upper eyelid blepharoplasty. The medial canthus is enlarged using a five-step method. At the 2-year follow-up after surgery, the scar on the inner corner of the eye was very fine and showed no signs of retraction. The patient was satisfied with the results (Fig. 5).

Case2: A 18-year-old woman underwent epicanthoplasty and upper eyelid blepharoplasty. The medial canthus is enlarged using a five-step method. At a follow-up of 6 months after surgery, the scar on the inner corner of

Table 1 Postoperative changes in the distance between medial canthus and eye fissures in 306 patients

Effect	Preoperative	Immediately after surgery	1 month after surgery	3 months after surgery	6 months after surgery	P
Intercanthal distance (ICD) (mm)	38.41 ± 0.25	34.92 ± 0.21	35.34 ± 0.19	35.63 ± 0.18	35.92 ± 0.22	0.0333
Palpebral fissure length (PFL) (mm)	26.82 ± 0.16	28.83 ± 0.11	28.51 ± 0.15	28.14 ± 0.19	27.93 ± 0.16	0.0258
Medial canthal angle (°)	57.18 ± 7.98	41.37 ± 7.95	42.18 ± 7.08	43.38 ± 7.74	44.18 ± 4.08	0.0433
Canthal tilt angle (°)	8.54 ± 2.96	6.54 ± 2.56	6.84 ± 3.06	7.04 ± 1.79	7.08 ± 2.07	0.0189

Table 2 Postoperative complications in 306 patients

Complications	1 week after surgery	1 month after surgery	3 months after surgery	6 months after surgery	12 months after surgery
Bleeding and swelling	2	0	0	0	0
Hypertrophic scar	0	62	85	34	0
Recrudescence	0	0	2	2	0
Bilateral asymmetry	0	4	4	4	0

Table 3 Satisfaction and effective rate of 306 patients

Effect evaluation	Very satisfied	Satisfied	General	Not satisfied	Significant effect	Effective	Invalid
Example count	222	73	5	6	295	9	2

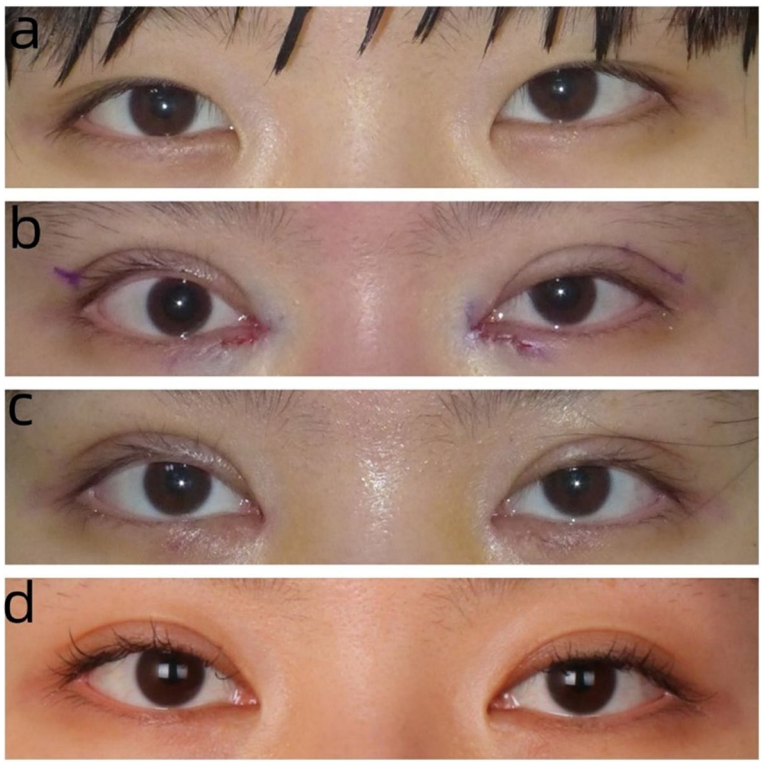

Fig. 5 **a** Before surgery, b postoperative day 7, c postoperative month 1, d postoperative month 24

the eye was very fine and showed no signs of retraction. The patient was satisfied with the results (Fig. 6).

Case3: A 25-year-old woman underwent an epicanthoplasty (without undergoing upper eyelid blepharoplasty). The medial canthus is enlarged using a five-step method. At a 3-year follow-up after surgery, the scar on the inner corner of the eye was very fine and showed no signs of retraction. The patient was satisfied with the results (Fig. 7).

Discussion

Epicanthal fold refers to the longitudinal arc-shaped skin fold covering the inner canthus, which affects the aesthetic appearance due to the coverage of the inner canthal angle and the caruncula lacrimalis. Currently, there are various surgical methods for the treatment of epicanthal folds [11, 12]. In clinical practice, surgeons mostly select the surgical approach based on their experience, leading beginners to face the dual dilemmas of complicated technical logic and the lack of standardization of surgical procedures. The five-step epicanthal fold correction technique proposed in this study establishes a standardized operation system by systematically deconstructing the key steps of the surgery, and its core advantages are reflected in the following aspects:

1 Theoretical basis for technological innovation

1) The Core of Tension Release. Since the clinical application of epicanthal fold correction surgery, there have been more than a hundred methods reported in the literature [13]. Beginners often cannot make accurate judgments when facing such a large number of complex methods. Scholars such as Saonanon [14] have confirmed through clinical research that the complete release of the vertical skin tension is the decisive factor for the success of the surgery, while the selection of the flap type only plays an auxiliary role. This surgical technique strictly follows this

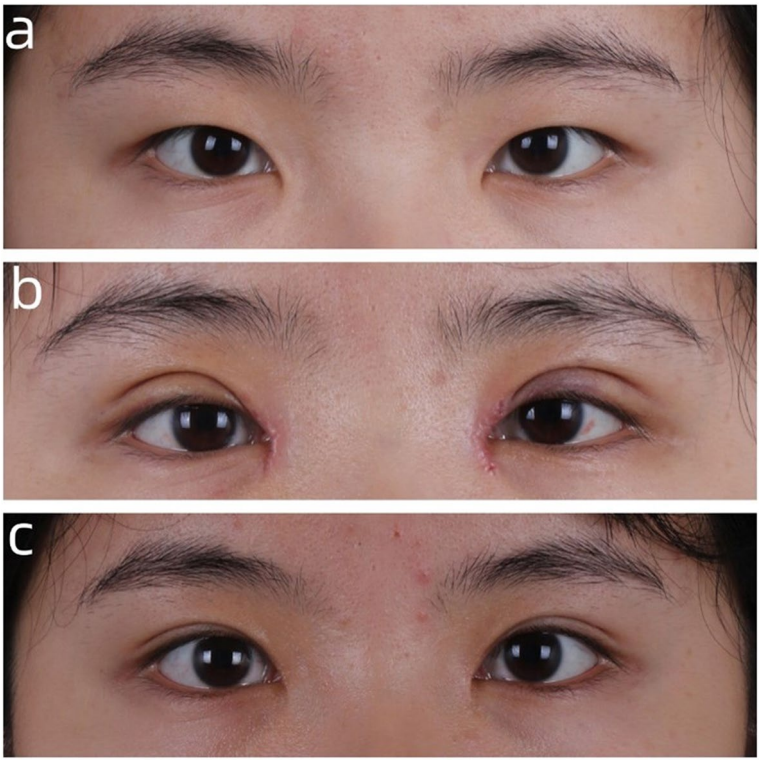

Fig. 6 a Before surgery, b postoperative day 7, c postoperative month 6

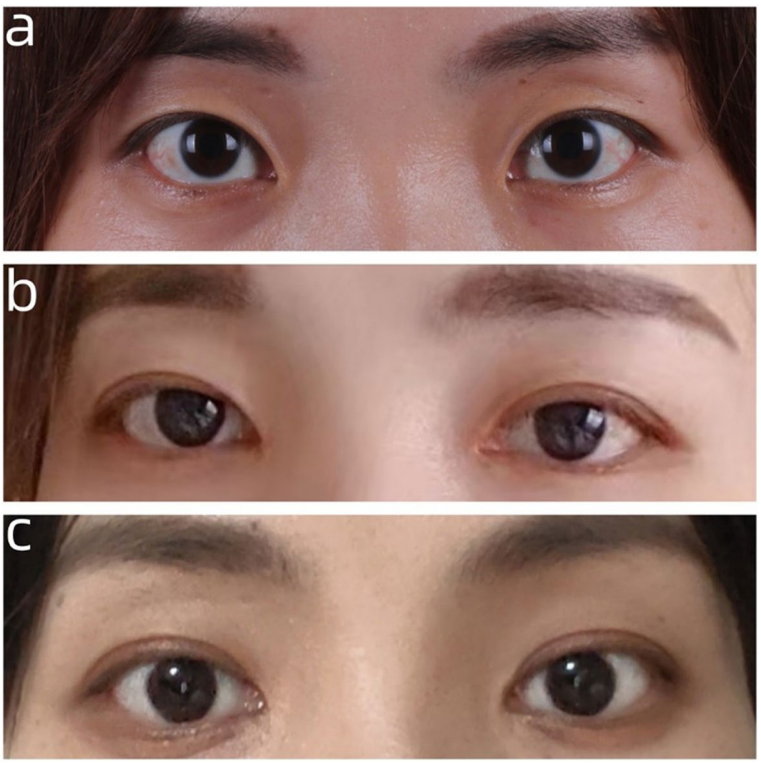

Fig. 7 a Before surgery, b postoperative day 20, c postoperative month 36

theory. Through the precise dissection of the subcutaneous tissue and the targeted resection of the orbicularis oculi muscle, the abnormal tension conduction pathway is eliminated at the biomechanical level.

2) The Anatomical Discovery of MCFB. Zhang et al. [7] defined the key anatomical structure of the medial canthal fibrous band (MCFB) for the first time through cadaveric dissection and clinical observation. This structure is composed of the thickened fibers of the orbicularis oculi muscle in the orbital septum and is located in the superficial layer of the medial canthal ligament. It is the tension conduction hub connecting the orbicularis oculi muscle and the skin. The presence of MCFB leads to the formation of vertical folds in the skin of the inner canthus, and its complete resection is the anatomical basis for correcting the epicanthal fold [15].

2 Technological innovations of the five-step epicanthal fold correction technique

1) Dynamic Flap Design Technique. The core logic of the traditional epicanthal fold correction surgery is based on the theory that the flap shape determines the outcome, that is, the redistribution of skin tension is achieved through preoperatively designed geometric shapes (such as the Z-shaped, V–Y shaped, or four-flap structure). This static design concept has significant limitations: Firstly, the preoperative design cannot accurately predict the individual differences in the relaxation degree of the medial canthal ligament after the resection of MCFB during the operation. Secondly, the fixed flap shape may exacerbate the imbalance of local tension vectors, leading to postoperative scar hyperplasia or distortion of the inner canthal shape. The breakthrough of the five-step epicanthal fold correction technique lies in establishing a technical paradigm where tension release takes precedence over flap design. This surgical technique abandons the static design concept of preoperatively presetting the flap in the traditional method and adopts a dynamic adjustment strategy of real-time tension assessment during the operation: After the resection of MCFB and the release of the orbicularis oculi muscle, the effect of tension release is verified through a traction test (pulling the skin of the inner canthus towards the nasal side and observing the disappearance of the folds); then, according to the geometric shape of the wound surface and the redundancy of the skin, surgical methods such as advancement flap, rotation flap, or combined flap are flexibly selected.

2) Standardized operation, reduced risk of complications, and improved controllability of results. For beginners, the more complex the surgical method, the more difficult it is to master, not only in terms of learning time, but also in terms of the uncontrollable nature of the surgical procedure itself. This method clearly outlines the five-step epicanthus correction technique in a straightforward manner, with each step and operation clearly explained, accompanied by detailed illustrations and videos. Beginners can easily follow each step to perform the operation, with a shorter learning period and easier grasp, which is conducive to early clinical practice by young doctors. For instance, junior surgeons in the plastic surgery division of our department, equipped with basic anatomical knowledge yet inexperienced in epicanthoplasty, can master the surgical principle in just 3 days through our standardized five—step teaching model. This model features detailed, step—by—step diagrams and video demonstrations. In contrast, traditional complex surgical techniques like the modified Mustarde method usually demand 2—3 weeks of theoretical study. This is due to the need for multi—layer tissue dissection and intricate suture design.During the clinical practice stage, junior surgeons trained with the five—step epicanthoplasty technique can perform the operation independently within 2 months. This is after participating in 5—8 surgeries under the guidance of teaching mentors. Specifically, they assist in the first 3 cases and independently carry out the key steps in the subsequent 2—5 cases. By stark contrast, for traditional complex surgical procedures, surgeons must be involved in 15—20 cases and it takes over 6 months before they are capable of operating independently. Moreover, early complications such as hypertrophic scars, asymmetrical medial canthal regions, recurrences, and postoperative swelling can severely dampen the learning enthusiasm and confidence of beginners, hindering the growth of young doctors. Due to its standardized operation, the method has high replicability, and the results can be controlled, with a reduced risk of complications, making it worthy of clinical application and promotion.

The following is a detailed discussion of each step:

Step 1: Preoperative design
During preoperative planning, no skin flap is predesigned, only the range of separation for the ABC flap is planned, because epicanthus is not a skin problem, but rather an abnormal traction caused by the orbicularis oculi muscle and MCFB on the skin. Therefore, preoperative planning does not require pre-designing a skin flap.
Step 2: Adequate subcutaneous separation
The medial canthus skin is relatively thin, with densely interwoven expression muscle fibers in the subcutaneous layer. This anatomical configuration renders the medial canthus skin susceptible to multiple muscle tensions. Zhang et al. [7] proposed that the top of the MCFB closely adheres to the posterior wall of the epicanthal fold skin. Additionally, the MCFB is connected to the surrounding septal orbicularis oculi muscle. Thus, the MCFB stretches the skin of the epicanthal fold and exerts traction. Consequently, the skin forms a fold, wrapping the orbicularis oculi muscle and covering the caruncle. The MCFB is the tension conductor from the muscle to the skin in the medial canthal area.
Therefore, the key of this step is to fully loosen the connection between MCFB and the top skin, and cut off the tension between MCFB and skin, so as to ensure that the skin of epicanthus is completely natural.
Step 3: Skeletonization of the medial canthal ligament surface
The primary factors contributing to epicanthus formation involve higher tension in the vertical direction of the skin compared to the horizontal direction, dislocation of the orbicularis oculi muscle,abnormal traction of the anterior orbicularis oculi muscle on the skin in the upper part of the medial canthus, and excessive relaxation of the medial canthal ligament [16]. Therefore, the key to successful surgery lies in executing flap formation, ensuring sufficient muscle release, and reducing tension in the medial canthal ligament across the skin layer, muscle layer, and medial canthal ligament layer, respectively [17]. Our third step focuses on the meticulous processing of bothmuscles and the medial canthal ligament.
In the normal population, the orbicularis oculi muscle completely terminates at the medial canthal ligament. Conversely, in patients with epicanthus, the muscle partially terminates at the medial canthal ligament and partly at the anterior lacrimal crest or lower eyelid. This creates a semi-circular webbed muscle bundle at the medial canthus, leading to the development of epicanthus. Autopsy findings by Park et al. [18] reveal that individuals with epicanthus have a connection between the orbital septum of the orbicularis oculi muscle at the medial canthus, whereas those without epicanthus do not. They believe that during embryonic development, as the eyeball gradually approaches, the connected fibers of the orbicularis oculi muscle become narrow and dense at the medial canthus, forming the core structure of epicanthus. Therefore, the critical aspect of the surgery involves complete release of the heterogeneous and misaligned orbicularis oculi muscle, severing the fibers between the orbicularis oculi muscle and the epicanthus, and fully exposing the medial canthal ligament.
The concept of "skeletonization" is often employed in tumor surgery, which involves the comprehensive removal of lymph and adipose tissue attached to the surrounding blood vessels during tumor enlargement and dissection. We apply a similar approach in the context of epicanthus correction by extensively removing the orbicularis oculi muscle attached to the medial canthal ligament and the subcutaneous fibrous connective tissue surrounding it prior to performing medial canthal ligament reduction. This process entails complete release of the heterogeneous and misaligned orbicularis oculi muscle, severing the fibers between the orbicularis oculi muscle and the epicanthus, and fully exposing the medial canthal ligament, resembling the concept of "skeletonization." Ultimately, this technique allows for the complete release of vertical and horizontal tension in the medial canthus area, minimizing the formation of postoperative scars to the greatest extent possible.
Step 4: Medial canthal ligament tension reduction
In contrast to other scholars, we prefer to designate this step as “medial canthal ligament tension reduction” rather than” medial canthal ligament shortening or folding". This choice stems from the understanding that the medial canthal epicanthus is is primarily a result of vertical and horizontal tension. Therefore, the pivotal focus of the surgery remains on the comprehensive reduction of tension. By mitigating the tension in the medial canthus ligament, the skin in the medial canthus naturally aligns. Moreover, the skin folds at the medial canthus can adeptly conceal the incision, yielding a more aesthetically pleasing outcome. It is imperative to make necessary corrections during tension reduction and suturing, as the tissue may undergo shrinkage over time.
Step 5: Skin treatment
After dealing with the tension in the medial canthus area, smooth out the skin flap. If there is an excess of the skin flap, it can be removed and then a Y-V suture can be directly performed. If the incision below the

medial canthus angle forms an approximately triangular defect due to the effect of tension, the surplus skin flap above the medial canthus (referred to as the ABC skin flap) can be repositioned and inserted into the defect site for suturing, followed by Z-shaped reconstruction. This underscores the adaptability of the method, allowing for the handling of the skin flap based on the specific circumstances post-tension reduction, easier for beginners to learn and master. The correction of epicanthus relies not solely on the choice of skin flap but rather on factors such as the length of the incision, the size of the wound resulting from abnormal attachment of the detached subcutaneous tissue, and the complete relief of tension in the displaced muscle. Whether it involves Y-V shaping, Z-modification, or other skin flap shaping surgeries, they are all intricately linked to their foundational principles. Only through the dissection of subcutaneous tissue and the removal of the orbicularis oculi muscle can all vertical and horizontal tension be alleviated, constituting the key to the success of the surgery [14].

Moreover, in the case of patients with dark circles under the eyes and individuals with a darker skin tone, correcting epicanthus may lead to scar hyperplasia and reduced pigmentation, creating a noticeable color disparity with the surrounding skin. Even after complete recovery, the scar area may retain a slightly lighter hue. Consequently, when conducting surgery on such patients, it is crucial to ensure they are thoroughly informed before the procedure and undergo a meticulous evaluation.

Of course, it's important to acknowledge that this method comes with certain limitations. Firstly, the five-step technique demonstrates limited efficacy in correcting inverted epicanthus, a subtype characterized by abnormal lower eyelid tension and soft tissue misalignment. Unlike conventional epicanthus, which involves horizontal/vertical skin/muscular tension imbalance addressed by this method's standardized protocol, inverted epicanthus requires targeted adjustments to the lower eyelid structure or specialized flap designs. The absence of such anatomical modifications in the current protocol may lead to insufficient correction or increased scarring risk. Clinically, this necessitates preoperative subtype identification, as inverted epicanthus patients require alternative techniques (e.g., modified flap procedures), thereby limiting the method's universality. Future research could develop complementary modules tailored to this subtype's unique anatomy. Secondly, owing to the study's design focus on a "simplified standardized protocol" rather than "efficacy comparison between the new technique and traditional methods", no control group was established. This precludes statistical validation of the method's advantages in key metrics such as operative time, scarring incidence, and long-term recurrence rate, which may undermine clinicians' confidence in its efficacy. Future research could design multicenter randomized controlled trials (RCTs) to compare short-term complications, long-term outcomes, and patient satisfaction, combined with imaging assessments to quantify anatomical improvements, thereby providing a more robust evidence-based foundation for clinical dissemination. However, by virtue of its convenience and standardization, this method can significantly shorten the learning cycle for beginners, ensure the controllability of postoperative outcomes, and reduce the incidence of complications, thus having remarkable advantages in clinical application and promotion. In subsequent studies, we will strictly establish control groups, compare the five-step method with traditional surgical procedures, collect and analyze data from multiple aspects, conduct multi-center and large-sample studies, and provide references for clinical research.

Conclusions

The results of this study indicate that the five-step method for correcting epicanthus is a simple, efficient, and reliable method. This method has a simple design, stable results, is easy for beginners to master, high patient satisfaction, and can achieve a good eye aesthetic appearance with minimal scar risk. Suitable for clinical promotion.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12886-025-04123-7.

Supplementary Material 1. Video1: The key steps of the Five-step Medial Epicanthoplasty.

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Informed consent was received for publication of the figures in this article.

Authors' contributions
J.C. and F.Y. designed research, J.C. and W.X. performed research, J.C. and W.C. analyzed data, and J.C., J.Z. wrote the paper.

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Data availability
All data generated or analysed during this study are included in this published article.

Declarations

Ethics approval and consent to participate
The experimental protocol was established, according to the ethical guide lines of the Helsinki Declaration and was approved by the Human Ethics Committee of The Second Affiliated Hospital of University of South China. Written informed consent was obtained from individual or guardian participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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