GSP–SPCI · Global Science Portal for Surgical, Procedural and Clinical Innovations · **Volume 1, Issue 2 (Jul–Dec) 2026** · Published: August 2026 · Open Access

CASE REPORT | RECONSTRUCTIVE SURGERY | OPEN ACCESS

Cleft Lip Reconstruction: A Case Report of Academic Interest — Embryology, Anatomy, Aetiology, and Surgical Management

Dr. O.P. Bhandari

MS, MRSH (London), FAIS

Chief Consultant Surgeon — Dr. Bhandari Piles Hospital / Manish Nursing Home, 4-5 Shastri Nagar, Chittorgarh – 312001, Rajasthan, India

Honorary Consultant Surgeon — M.P. Birla Hospital & Research Centre, Sethi-Chittorgarh

ORCID: 0009-0008-3982-0950 | opbhandari@hotmail.com

Received (Submitted)	15 May 2026
Decision (Accepted)	02 July 2026
Published Online	August 2026
Journal / Volume	GSP-SPCI (GSPCI) · Volume 1, Issue 2 (Jul–Dec) 2026 · Open Access · COPE Compliant
Article Type	Case Report · Reconstructive Surgery · Historical Case
Peer Reviewed By	Surgical technique & plastic surgery section: Dr. M.P. Agrawal, MS, MCh (Plastic Surgery) | Anaesthesia section: Dr. Anand Derashri, MD (Anaesthesia)

1:700	10 Weeks	Wks 4–8	4%
LIVE BIRTHS (GLOBAL INCIDENCE)	IDEAL AGE FOR SURGERY (RULE OF 10S)	EMBRYOLOGICAL ORIGIN	SIBLING RECURRENCE RISK

Operative Video: youtube.com/watch?v=Uk8q_8Ebjuc | Full Library: youtube.com/@DrOmPrakashBHANDARI/videos

1. ABSTRACT

BACKGROUND

Cleft lip (cheiloschisis) is among the most common congenital craniofacial anomalies worldwide, affecting approximately 1 in 700 live births globally, with a notably higher incidence in Asian populations. It arises from failure of fusion of the medial nasal process and maxillary process during weeks 4–8 of embryogenesis. Without timely correction, it causes significant functional impairment — feeding difficulty, speech problems, dental malalignment — and profound psychosocial sequelae for both child and family.

CASE SUMMARY

An 8-year-old male child (20 kg) from a rural, economically disadvantaged family presented in 2004 with a complete left-sided unilateral cleft lip with associated nasal deformity, without cleft palate or syndromic features. Haemoglobin was 11.2 g/dL. The operation was performed by Dr. O.P. Bhandari at Manish Nursing Home / Piles Hospital, Chittorgarh. No electronic monitoring was available; the anaesthetist's hand on the patient's pulse was the sole intraoperative monitoring system.

SURGICAL TECHNIQUE

The incision design was first planned on paper, then transferred to the cleft lip as precise dot markings using a paint. The length of tissue deficit to be recovered from each flap was measured prior to incision. A thick gauze pack was placed between the lip and upper gum before incision. Incisions were made with a cataract knife for precision. Throughout dissection and repair, the delicate flaps were never grasped with any surgical instrument — holding (stay) sutures were used exclusively for flap manipulation to preserve vascularity. Repair was performed in three distinct anatomical layers: mucosa, orbicularis oris muscle, and skin. Simultaneous primary rhinoplasty corrected the displaced alar cartilage.

OUTCOME

The patient achieved excellent cosmetic and functional restoration. Philtral symmetry, Cupid's bow morphology, and nasal tip projection were well-restored. Oral intake and normal diet were resumed within two weeks postoperatively.

Keywords: Cleft lip; Cheiloschisis; Millard technique; Rotation-advancement flap; Congenital craniofacial anomaly; Orbicularis oris; Primary rhinoplasty; Reconstructive surgery; Chittorgarh.

2. INTRODUCTION

Cleft lip, or *cheiloschisis* (from the Greek: *cheilos* = lip, *schisis* = split), is a congenital orofacial cleft resulting from incomplete fusion of the facial processes during early embryogenesis. It may occur in isolation or in combination with cleft palate, constituting a spectrum of anomalies known as cleft lip and/or palate (CL/P).

CLASSIFICATION

- Unilateral (left > right) or Bilateral
- Complete — cleft extends through the full height of the lip to the nasal floor
- Incomplete — partial disruption of the lip with an intact Simonart's band
- May be associated with: Cleft palate, Pierre Robin sequence, Van der Woude syndrome

EPIDEMIOLOGY

The global incidence of cleft lip with or without palate is approximately 1 in 700 live births, making it one of the most prevalent congenital anomalies. Incidence varies significantly by ethnicity:

- Asian populations: approximately 1 in 500 live births (highest incidence)
- Caucasian populations: approximately 1 in 700
- African populations: approximately 1 in 2,500 (lowest incidence)

Males are more commonly affected for cleft lip with or without cleft palate. Isolated cleft palate is more common in females.

This case report serves as a comprehensive academic resource for medical undergraduates, postgraduate surgical trainees, and practising reconstructive surgeons, presenting a detailed review from embryological basis to operative technique and long-term management, illustrated by an actual operative case performed at Dr. Bhandari Piles Hospital / Manish Nursing Home, Chittorgarh, Rajasthan.

3. EMBRYOLOGY

Normal facial development is a precisely timed and coordinated process occurring during early gestation. Disruption at any stage can result in cleft lip or palate. Understanding the embryological sequence is fundamental to understanding why these anomalies occur.

DEVELOPMENTAL TIMELINE

Week	Developmental Events
Week 4	Frontonasal process appears. Neural crest cells migrate to form facial primordia. Stomodeum (primitive mouth) becomes visible.
Week 5	Paired maxillary and mandibular processes grow from first branchial arch. Nasal placodes form on the frontonasal process, creating medial and lateral nasal processes.
Weeks 6–7	Medial nasal processes fuse with each other and with the maxillary processes to form the **PRIMARY PALATE** (philtrum, premaxilla, anterior hard palate). **FAILURE HERE → CLEFT LIP.**
Weeks 8–12	Secondary palate forms from palatine shelves of maxillary processes — elevate and fuse with each other and the nasal septum. **FAILURE HERE → ISOLATED CLEFT PALATE.**

KEY EMBRYOLOGICAL CONCEPTS

- Cleft lip is a defect of the **PRIMARY PALATE** (pre-incisive foramen region)
- It results from failure of mesenchymal migration and fusion between the medial nasal process and the maxillary process
- The orbicularis oris does not cross the midline — instead inserting abnormally into the alar base and columella
- The left side is affected more commonly than the right (approximately 60:40), attributed to asymmetric timing of fusion during development
- Bilateral cleft lip results from bilateral failure of fusion of both maxillary processes with the intermaxillary segment

4. ANATOMY

NORMAL LIP ANATOMY

- **Orbicularis oris:** A continuous muscular sphincter crossing the midline — the KEY MUSCLE for lip function
- **Philtrum:** The central vertical groove between two philtral columns (ridges), from the nasal base to the Cupid's bow
- **Cupid's bow:** The double-curved vermilion border of the upper lip, with twin peaks and a central dip
- **Columella:** The central strip of tissue forming the bridge between the nostrils
- **Alar bases:** The lateral attachments of the alar cartilages — should be symmetric, width approximately equal to the intercanthal distance
- **White roll:** The pale ridge just above the vermilion border — a critical landmark in repair

ANATOMY IN CLEFT LIP

- **Orbicularis oris:** ABNORMALLY inserted into the alar base and columella on the cleft side — muscle fibres run parallel to the cleft margin rather than crossing the midline
- **Philtral columns:** Disrupted — the cleft-side column is absent or misaligned
- **Vermilion border (Cupid's bow):** Asymmetric — the peak on the cleft side is displaced inferiorly
- **Nasal floor:** Absent in complete cleft, resulting in communication between mouth and nasal cavity
- Muscle mass is present but malinserted — this is why *functional reconstruction* (not just skin closure) is mandatory

NASAL DEFORMITY IN UNILATERAL CLEFT LIP

- Lower lateral (alar) cartilage: Displaced inferiorly, laterally, and posteriorly on the cleft side
- Nasal septum: Deviates toward the non-cleft side
- Columella: Shortened on the cleft side — base pulled toward the cleft
- Alar base: Widened and displaced — inferiorly and laterally malpositioned
- This nasal complex must be addressed either at primary repair (primary rhinoplasty) or at secondary surgery

5. AETIOLOGY AND RISK FACTORS

The aetiology of cleft lip is multifactorial. The **Multifactorial Threshold Inheritance Model** is most widely accepted — cleft lip arises from an interplay of multiple genetic susceptibilities

and environmental exposures that cross a developmental threshold during weeks 4–8 of gestation.

GENETIC FACTORS

- Mutations in *IRF6* (most commonly implicated gene), *TBX22*, *MSX1* genes
- Family history: ~4% recurrence risk if one sibling affected; ~9% if a parent is affected
- Chromosomal anomalies: Trisomy 13 (Patau syndrome), Trisomy 18 (Edwards syndrome)
- Associated genetic syndromes: Van der Woude syndrome, Pierre Robin sequence, Holoprosencephaly

ENVIRONMENTAL AND TERATOGENIC FACTORS

- Folic acid deficiency in the first trimester — supplementation (400 mcg/day periconceptionally) reduces risk
- Maternal smoking: significantly increases risk (dose-dependent)
- Maternal alcohol use
- Anti-epileptic drugs: phenytoin, valproate (strong teratogens for clefting)
- Corticosteroid use in early pregnancy
- Pre-gestational maternal diabetes
- Viral infections in first trimester (rubella, CMV)

The multifactorial model explains the racial, geographic, and familial variation in incidence without a single causative gene or exposure in most cases.

6. CASE PRESENTATION

Note: Patient details have been anonymised in accordance with ethical guidelines for case report publication.

PATIENT DEMOGRAPHICS

Age	8 years (operated in 2004)
Sex	Male
Delivery	Delivered at term via normal vaginal delivery

Antenatal	No antenatal complications reported by mother
Family History	No family history of cleft lip or palate
Teratogen Exposure	No maternal drug use or significant teratogen exposure identified

CHIEF COMPLAINT

The child and parents, a rural family of limited economic means, presented in 2004 with cosmetic deformity of the upper lip present since birth, difficulty in feeding, social embarrassment and teasing at school, and visible nasal distortion on the left side. The family sought surgical correction due to the significant psychosocial impact on the child.

> *It is important to record that in the year 2004, superspeciality medical services — plastic surgery, craniofacial surgery — were not widely available even at higher centres in India. Rural patients and their families were largely unaware that such specialised surgical correction even existed within the medical system. It was therefore the privilege and responsibility of the district-level general surgeon to provide this care.*

CLINICAL FINDINGS

- Complete left-sided unilateral cleft lip extending from the vermilion border through the full height of the lip to the nasal floor
- Disruption of the alar base on the left — widened left nostril
- Orbicularis oris absent across the cleft — muscle palpable but malinserted
- Cupid's bow: Asymmetric — left peak displaced inferiorly
- No associated cleft palate on examination
- No dysmorphic or syndromic features

PREOPERATIVE ANTHROPOMETRIC MEASUREMENTS

Measurement	Value
Philtral height — non-cleft side	8 mm
Philtral height — cleft side	5 mm
Columellar length	4 mm

Measurement	Value
Alar base width — non-cleft side	12 mm
Alar base width — cleft side	16 mm (widened by 4 mm)

7. INVESTIGATIONS

- **CBC:** Haemoglobin 11.2 g/dL — within acceptable range for elective surgery under general anaesthesia in an 8-year-old child
- **Blood group and cross-match:** Performed preoperatively as standard protocol
- **Nutritional assessment:** Weight 20 kg — adequate for elective surgery; BMI and nutritional status assessed and found satisfactory
- **Preoperative photography:** Standard frontal, lateral, and worm's eye view photographs documented for surgical planning and medical records
- **Genetics referral:** Not required — isolated non-syndromic unilateral cleft lip without family history or dysmorphic features
- **Antenatal imaging:** Parents reported no antenatal ultrasound diagnosis; facial cleft was not identified prenatally

8. SURGICAL MANAGEMENT

THE RULE OF 10S — CRITERIA FOR SAFE OPERATIVE TIMING

10 Weeks
Minimum Age for Primary Repair

10 lbs
Minimum Weight (4.5 kg)

10 g/dL
Minimum Haemoglobin

Note: The classical Rule of 10s applies to infant primary repair (typically at 10 weeks of age). This patient, an 8-year-old child weighing 20 kg with Hb 11.2 g/dL, underwent delayed primary repair in 2004; operative fitness was assessed by standard paediatric anaesthetic criteria — all parameters satisfactory for elective surgery.

ANAESTHESIA

General anaesthesia with endotracheal intubation was administered. Half of the oral cavity was packed with the endotracheal tubing system to protect the airway, prevent blood aspiration, and maintain an unobstructed surgical field.

HISTORICAL RECORD — ANAESTHETIC CONDITIONS, CHITTORGARH, 2004

In 2004, electronic patient monitoring as understood today was not available at district-level medical centres in India. There was no pulse oximeter. There was no multiparameter monitor. Blood pressure, oxygen saturation, capnography, and ECG monitoring — now considered the minimum standard of anaesthetic care — were absent. The anaesthetic agents available were oxygen and halothane gas, administered via the endotracheal tube through a Goldman vaporizer. **The sole monitoring system throughout the procedure was the anaesthetist's own hand placed on the patient's pulse** — reading rate, rhythm, and volume by direct palpation, continuous and uninterrupted, from induction to recovery. This demanded extraordinary clinical skill, concentration, and experience from the anaesthetist, and absolute trust and coordination between surgeon and anaesthetist. That this child underwent successful general anaesthesia for a reconstructive procedure under these conditions — and recovered without complication — is a tribute to the clinical competence of the entire operating team.

OPERATIVE TECHNIQUE: MILLARD ROTATION-ADVANCEMENT FLAP

The Millard rotation-advancement technique was employed — the internationally recognised gold standard for unilateral cleft lip repair, offering natural scar placement along the philtral column with superior aesthetic reproducibility.

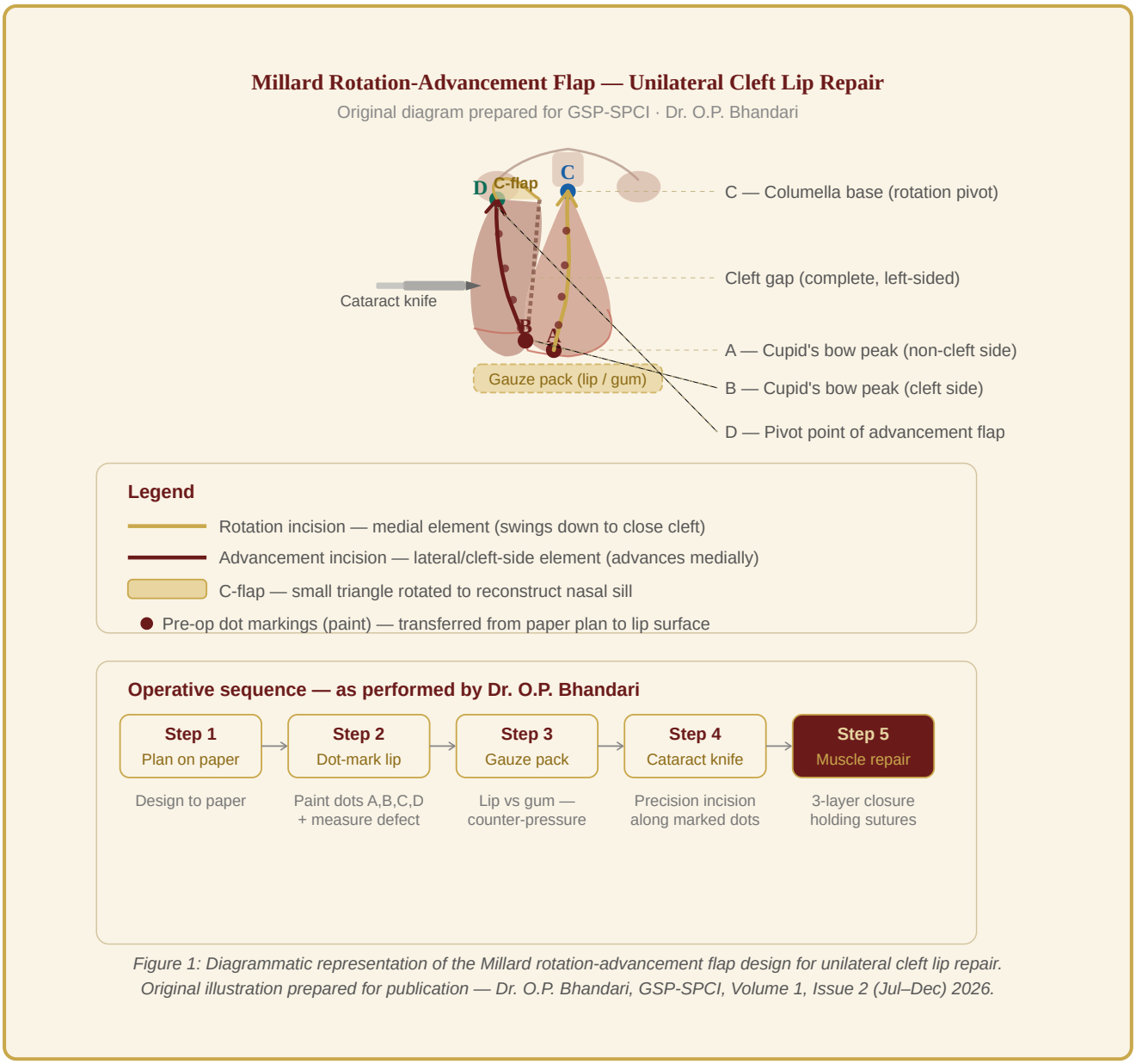


Figure 1: Diagrammatic representation of the Millard rotation-advancement flap design for unilateral cleft lip repair. Original illustration prepared for publication — Dr. O.P. Bhandari, GSP-SPCI, Volume 1, Issue 2 (Jul–Dec) 2026.

STEP	PHASE	DETAILS
1	LANDMARK MARKING & PRE-OPERATIVE PLANNING	The entire incision design was first planned and committed to paper before the patient entered the operating theatre. Key anatomical points were then transferred to the cleft lip using precise dot markings applied with a paint (marking agent) directly on the skin surface of the cleft lip — each dot corresponding to a critical landmark: A (Cupid's bow peak — non-cleft side), B (Cupid's bow peak — cleft side), C (columella base), D (pivot point of

STEP	PHASE	DETAILS
		advancement flap). **The length of tissue deficit to be recovered from each flap was carefully measured and calculated at this stage**, ensuring that the rotation flap and advancement flap together would provide adequate tissue to close the defect without tension. All measurements were verified bilaterally before any incision was made. This meticulous pre-operative planning on paper, followed by precise dot-marking on the patient, is the foundation upon which the entire repair rests.
2	SURGICAL FIELD PREPARATION & INCISION	Prior to making any incision, a **thick gauze pack was inserted between the lip and the upper gum (gingivolabial sulcus)**. This pack served a critical dual purpose: it provided firm counter-pressure behind the lip to stabilise the tissue during incision, and it protected the gum and underlying structures from inadvertent injury. The incisions were then executed using a **cataract knife (keratome)** — a fine, sharp, precision blade chosen for its ability to make clean, controlled cuts through the delicate lip tissue with minimal trauma. The rotation incision was carried from the Cupid's bow upward around the columella base on the medial (non-cleft) element; the advancement incision was placed along the lateral (cleft-side) margin to create the C-flap for nasal sill reconstruction. The sharpness and precision of the cataract knife

STEP	PHASE	DETAILS
		ensured accurate incision lines that followed the pre-marked dots exactly, translating the pre-operative design faithfully into the operative field. Layered repair then followed.
3	MUSCLE DISSECTION	Orbicularis oris carefully dissected free from its anomalous insertion at the alar base and columella on both sides of the cleft. **This is the most critical technical step — meticulous dissection determines functional outcome.**
4	THREE-LAYER CLOSURE — MUCOSA, MUSCLE & SKIN	Repair was performed in three distinct anatomical layers, each closed separately and meticulously: **Layer 1 — Mucosal layer (innermost):** The oral mucosal lining on the inner aspect of the lip was approximated first, restoring the internal lining of the lip and providing a watertight inner seal. 2-0 Chromic Catgut absorbable sutures were used. **Layer 2 — Muscle layer (orbicularis oris):** The orbicularis oris muscle — the critical functional sphincter of the lip — was re-approximated in anatomical continuity across the midline. This is the most important layer: restoring the continuous muscular ring of the lip determines both functional competence (oral seal, feeding, speech) and the long-term aesthetic result. 2-0 Chromic Catgut was used for this layer.

STEP	PHASE	DETAILS
		Layer 3 — Skin (outermost): The skin was closed last with 2-0 Mersilk (black braided silk) sutures, placed with meticulous alignment of the white roll, Cupid's bow peaks, and philtral columns to achieve the finest possible aesthetic result. **Instrument handling — a critical technical point:** Throughout the entire dissection and repair, **the rotation and advancement flaps were never grasped or held with any surgical instrument** — no tissue forceps, no Allis clamp, no toothed or non-toothed grasper was applied to the flap skin or edges. The skin and subcutaneous tissue of these delicate flaps are highly vulnerable to crush injury, vascular compromise, and subsequent necrosis if handled with instruments. Instead, **holding (stay) sutures were placed through the flap edges** and used exclusively to manipulate, position, and retract the flaps throughout the procedure. The assistant held these sutures under gentle, controlled tension while the surgeon worked. This technique — instrument-free flap handling using holding sutures — is the hallmark of the experienced reconstructive surgeon and is essential to preserve flap vascularity and ensure primary wound healing without necrosis or dehiscence.

STEP	PHASE	DETAILS
		Note: In 2004, modern synthetic absorbable sutures (Vicryl, PDS) were not yet in routine use at district-level centres; 2-0 Chromic Catgut was the standard absorbable suture of the era and served excellently for the mucosal and muscle layers. Mersilk (braided black silk) was the standard non-absorbable skin suture of the era.
5	**PRIMARY RHINOPLASTY & FINAL CHECK**	Primary rhinoplasty was performed simultaneously to reposition the displaced lower lateral (alar) cartilage on the cleft side and restore nasal symmetry. Columellar length was augmented by rotation of the flap. Throughout this final step, all flap manipulation continued to be performed exclusively using holding sutures — no instrument was applied directly to the flap skin at any stage. On completion, the three-layer repair was inspected for symmetry of the white roll, alignment of the Cupid's bow peaks bilaterally, tension-free skin closure, and correct nasal tip projection. The Logan's bow (lip guard) was then applied to protect the repair from tension during the immediate postoperative period.

▶ **Operative Video:** The complete operative procedure performed by Dr. O.P. Bhandari is available for viewing on YouTube as an invaluable visual resource for surgical trainees and reconstructive surgeons: **https://www.youtube.com/watch?v=Uk8q_8Ebjuc** | Full Surgical Library: youtube.com/@DrOmPrakashBHANDARI/videos

TECHNIQUE COMPARISON: MILLARD VS TENNISON-RANDALL

Feature	Millard (Rotation-Advancement)	Tennison-Randall (Triangular Flap)
Scar position	Along philtral column — natural, concealed	Crosses the philtrum — more visible
Aesthetic result	Superior — most natural appearance	Good but scar crosses critical anatomy
Vertical lip height	Relies on rotation — may be slightly deficient	More reliable restoration of height
Learning curve	Steeper — requires surgical experience	More predictable markings
Rhinoplasty	Easily combined with primary rhinoplasty	Can be combined
Preferred for	Most unilateral clefts; experienced surgeons	Cases with significant vertical height deficit

9. POSTOPERATIVE CARE

- **Wound protection:** Patient cooperation obtained with clear verbal instruction; elbow restraints used for infants but not required at this age
- **Diet — Days 1 to 5 (liquid phase):** For the first five postoperative days, the patient was advised to take all nutrition exclusively as liquids, consumed through a straw to avoid direct contact with the repair, prevent suction forces on the freshly closed wound, and minimise lip movement during the critical early healing period. **Commercial straws were not available in Chittorgarh at that time (2004).** Dr. O.P. Bhandari improvised by fashioning a straw from a used intravenous (IV) drip set tube — the thin, flexible, transparent plastic tubing from a discarded IV giving set was cut to an appropriate length, thoroughly cleaned, and provided to the family as a functionally ideal substitute straw at no cost. This simple resourceful solution ensured the child could feed safely without any risk to the repair, and stands as a small but telling example of the practical ingenuity that district-level surgery in a resource-limited setting demands.
- **Diet — Days 6 onwards:** Semi-solid and soft diet for 2–3 weeks; hard, crunchy, or chewy foods avoided throughout the healing period
- **Wound care:** Gentle saline cleansing of the suture line twice daily; antibiotic ointment applied
- **Suture removal:** 2-0 Mersilk skin sutures removed at 7 days; patient cooperation satisfactory, no sedation required
- **Logan's bow (lip guard):** Applied to reduce tension across the repair during healing

- **Medications:** Analgesics (paracetamol as per weight), prophylactic antibiotics for 5 days, antacids as required
- **Follow-up schedule:** 1 week → 1 month → 3 months → 6 months → annually until facial skeletal growth complete (~18 years)
- **Scar management:** Silicone gel sheets commenced at 6–8 weeks once wound fully epithelialised

HISTORICAL RECORD — POSTOPERATIVE FEEDING, CHITTORGARH, 2004

In 2004, commercial drinking straws were not available in Chittorgarh — a small district town in rural Rajasthan. Following cleft lip repair, liquid feeding through a straw is essential for the first several postoperative days: it protects the suture line from direct contact, eliminates suction forces on the freshly closed orbicularis oris repair, and minimises involuntary lip movement that could disrupt wound healing. Faced with the unavailability of a straw, Dr. O.P. Bhandari devised a practical solution: the transparent plastic tubing of a used intravenous (IV) drip giving set — discarded after clinical use, cleaned, and cut to an appropriate length — served as a feeding straw for the child for the first five postoperative days. The solution cost nothing, was immediately available in any clinical setting of that era, and functioned perfectly. The child fed safely on liquids throughout the critical early healing period without any complication to the repair. This improvisation was not remarkable to the surgeon — it was simply what the situation required. But it deserves to be recorded, because it captures precisely the kind of adaptive clinical thinking that allowed surgical care of metropolitan standard to be delivered in a district setting where metropolitan resources simply did not exist.

10. OUTCOME AND DISCUSSION

The patient achieved an excellent cosmetic and functional outcome at all scheduled follow-up visits:

- Wound healed primarily — no dehiscence or infection
- Philtral symmetry well-restored with natural-appearing scar concealed along the philtral column
- Cupid's bow morphology symmetrical bilaterally
- Nasal tip symmetry markedly improved — alar base repositioned and columellar length restored

– Oral intake normalised within two weeks postoperatively; child resumed normal diet

– Orbicularis oris functional continuity confirmed by lip puckering and normal oral competence

POTENTIAL COMPLICATIONS

Complication	Management
Wound dehiscence	Risk minimised by tension-free closure and Logan's bow
Scar hypertrophy or widening	Addressed by silicone gel and, if needed, scar revision at maturity
Residual nasal deformity	Secondary rhinoplasty planned at skeletal maturity (~16–18 years)
Vermilion notching	Meticulous white roll alignment at primary repair is critical to avoid this
Orbicularis mismatch	Adequately addressed by full muscle dissection and layered repair
Revision surgery	Approximately 15–20% of patients require some degree of lip or nasal revision

HISTORICAL AND SOCIAL CONTEXT: DISTRICT SURGERY IN RURAL INDIA, 2004

HISTORICAL DOCUMENT

The year 2004 represents a distinct era in Indian healthcare. Superspeciality surgical services — plastic surgery, craniofacial surgery, cleft care teams — were confined almost exclusively to large teaching hospitals and private institutes in metropolitan cities such as Delhi, Mumbai, and Chennai. For the vast rural population of Rajasthan, these centres were geographically remote, financially inaccessible, and — most significantly — **unknown**. Rural families, often with no formal education and limited contact with the healthcare system, were simply unaware that a child born with a cleft lip could be surgically corrected.

It was in precisely this context that this 8-year-old child from rural Chittorgarh district reached the operating table. Dr. O.P. Bhandari, working in the operation theatre situated in the basement of Manish Nursing Home / Piles Hospital, Chittorgarh, performed the complete reconstructive procedure using the materials of the era. The result was excellent — an uncomplicated general anaesthetic, a successful reconstruction, and a child who walked out transformed.

This case is therefore not merely a surgical report — it is a historical document. It records a moment when a single surgeon, equipped with training, skill, and dedication, bridged the gap between what modern medicine could offer and what a rural family could access. It underscores the enduring importance of the broadly trained general surgeon in the Indian healthcare system.

LONG-TERM MULTIDISCIPLINARY PLAN

Intervention	Timing / Details
Alveolar bone grafting	Age 8–10 years (iliac crest graft to close alveolar cleft if present)
Palate repair	If indicated — Furlow palatoplasty or Von Langenbeck technique (age 6–18 months)
Orthodontic treatment	Comprehensive — pre-surgical nasoalveolar moulding (PNAM), mixed dentition, and definitive treatment
Speech therapy	Commenced early for all patients with CL/P — addresses velopharyngeal incompetence and articulation
Psychology support	Addressing psychosocial impact on child and family throughout childhood and adolescence
Secondary rhinoplasty	At skeletal maturity for residual nasal deformity

11. KEY LEARNING POINTS

FOR MEDICAL STUDENTS

1. Cleft lip arises from failure of fusion of the medial nasal process and maxillary process between weeks 4–8 of gestation — this is a **primary palate defect**

2. Cleft lip (pre-incisive) is embryologically distinct from cleft palate (post-incisive); they may coexist or occur in isolation

3 The Rule of 10s (10 weeks age, 10 lbs weight, 10 g/dL Hb) defines the minimum standard for safe infant primary repair; in delayed presentation, standard paediatric anaesthetic fitness criteria are applied

4 Folic acid supplementation periconceptionally reduces the incidence of cleft lip — a key public health message

5 Antenatal ultrasonography at 18–20 weeks can detect cleft lip, enabling family counselling and planning of multidisciplinary care before birth

FOR POSTGRADUATE TRAINEES AND SURGEONS

1 Meticulous anatomical repair of the orbicularis oris is the single most critical determinant of both functional and aesthetic outcome — skin closure alone is inadequate

2 **Three-layer closure is mandatory** — mucosa first, then orbicularis oris muscle, then skin. Each layer must be closed separately and correctly. Collapsing these into one or two layers compromises both function and healing

3 **Never grasp the flap skin or edges with any surgical instrument.** The rotation and advancement flaps are delicate, perfusion-dependent structures. Instrument crush injury — even momentary — can devascularise the flap and cause necrosis or dehiscence. Use **holding (stay) sutures** placed through the flap edges for all manipulation and retraction throughout the procedure

4 The Millard rotation-advancement flap places the scar along the natural philtral column — surgical trainees should study Millard's *Cleft Craft* as the foundational text

5 Primary nasal correction should ideally be performed simultaneously with lip repair to reposition the displaced alar cartilage and prevent progression of nasal deformity

6 A true multidisciplinary team — surgeon, paediatrician, orthodontist, speech therapist, audiologist, psychologist — is essential from birth to adulthood for holistic cleft care

7 Pre-surgical nasoalveolar moulding (PNAM), when available, can improve nasal shape and reduce the magnitude of surgical correction required at primary repair

12. CONCLUSION

Cleft lip is a correctable congenital anomaly with excellent long-term outcomes when managed early, skilfully, and comprehensively. The Millard rotation-advancement flap remains the gold standard for unilateral cleft lip repair — offering natural scar placement, reliable aesthetic restoration, and compatibility with simultaneous primary nasal correction.

This case, operated upon in the year 2004 by Dr. O.P. Bhandari at Manish Nursing Home / Piles Hospital, Chittorgarh — in the dedicated operation theatre situated in the basement of the hospital, a facility that continues to serve patients to this day — carries historical and social significance that goes beyond the surgical technique itself. Dr. Bhandari, then the only surgeon equipped and willing to undertake this procedure in the region, personally planned and executed the complete reconstruction — from operative design to wound closure — using the materials available at the time: 2-0 Chromic Catgut for deep layers and 2-0 Mersilk (black braided silk) for skin. The result was excellent.

> *This case stands as a powerful reminder that surgical excellence is not a privilege of metropolitan institutions alone — it is a duty of every trained surgeon, wherever they practise. Early diagnosis and timely surgical correction, combined with anatomically sound orbicularis oris reconstruction and a lifelong multidisciplinary management plan, are the pillars of optimal outcome for every child born with a cleft lip.*

When presentation is delayed, as in this case, surgical correction remains highly effective and must not be withheld on grounds of age alone.

13. REFERENCES

1. Millard DR Jr. *Cleft Craft: The Evolution of Its Surgery.* Vol. I. Boston: Little, Brown and Company; 1976.
2. Mossey PA, Little J, Munger RG, Dixon MJ, Shaw WC. Cleft lip and palate. *Lancet.* 2009;374(9703):1773–1785.
3. World Health Organization. *Global Registry and Database on Craniofacial Anomalies.* Geneva: WHO; 2003.
4. Shkoukani MA, Chen M, Vong A. Cleft lip: a comprehensive review. *Front Pediatr.* 2013;1:53.
5. Dixon MJ, Marazita ML, Beaty TH, Murray JC. Cleft lip and palate: understanding genetic and environmental influences. *Nat Rev Genet.* 2011;12(3):167–178.
6. Byrd HS, Salomon J. Primary correction of the unilateral cleft nasal deformity. *Plast Reconstr Surg.* 2000;106(6):1276–1286.

7. Tennison CW. The repair of the unilateral cleft lip by the stencil method. *Plast Reconstr Surg.* 1952;9(2):115–120.

8. Bhandari OP. Operative Video Series — Cleft Lip Repair. YouTube Channel: Dr. Om Prakash BHANDARI. Available at: https://www.youtube.com/watch?v=Uk8q_8Ebjuc [Accessed June 2026].

9. Bhandari OP. Full Surgical Library. YouTube: https://www.youtube.com/@DrOmPrakashBHANDARI/videos

Correspondence & Contact

Dr. O.P. Bhandari, MS, MRSH (London), FAIS

Chief Consultant Surgeon — Dr. Bhandari Piles Hospital / Manish Nursing Home

4-5 Shastri Nagar, Chittorgarh – 312001, Rajasthan, India

Honorary Consultant Surgeon — M.P. Birla Hospital & Research Centre, Sethi-Chittorgarh

EMAIL

opbhandari@hotmail.com | ORCID: 0009-0008-3982-0950

HOSPITAL LOCATION

Google Maps: Dr. Bhandari Piles Hospital, Chittorgarh

OPERATIVE VIDEO & SURGICAL LIBRARY

youtube.com/watch?v=Uk8q_8Ebjuc | youtube.com/@DrOmPrakashBHANDARI/videos

Published in **GSP-SPCI · Volume 1, Issue 2 (Jul–Dec) 2026** · Global Science Portal for Surgical, Procedural and Clinical Innovations · Open Access · COPE Compliant

© Dr. O.P. Bhandari, Chittorgarh, Rajasthan | GSP-SPCI | Journal Portal Home