



Timing of Primary Cleft Lip and Palate Surgery in India: A Multi-Regional Analysis Using Validated Institutional and Published Data

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ABSTRACT

Background: Timely cleft lip and/or palate (CLP) surgery is critical for speech, feeding, and psychosocial outcomes. Ideal surgical benchmarks recommend lip repair by 12-months and palate repair by 18-months. However, delays are common in India.

Objective: To evaluate the timing of primary cleft surgeries in India using validated institutional and published information across various regions.

Methods: Eight sources from Sub-Himalayan, Himachal Pradesh, Tamil Nadu, Bihar, Uttar Pradesh, Maharashtra, and national datasets were analyzed. Metrics included mean/median age at lip and palate repair and proportion of patients treated on-time (≤ 12 months for lip ≤ 18 months for palate).

Results: AIIMS Patna reported the lowest median lip repair age (11-months). Other centers reported delayed presentations: Diwana (33.6-months), Prabakaran (36-months), Gupta (162-months). On-time lip repair ranged from 15% (TISS report) to 43.6% (Dvivedi). On-time palate repair was consistently $< 20\%$.

Conclusion: Most Indian cleft patients undergo delayed surgery. Barriers include poor nutrition, referral delays, and lack of caregiver awareness. Improvements require integrated systems of early detection, caregiver education, and decentralized surgical access.

KEYWORDS: Cleft lip, Cleft palate, Delayed repair, On-time surgery, Surgery timing.

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INTRODUCTION

Cleft lip and/or palate (CLP) affects approximately 1 in 700 live births globally and imposes significant challenges to feeding, speech development, and social integration. Timely surgical intervention is central to optimizing outcomes. Global guidelines recommend cleft lip repair by 12-months and cleft palate repair by 18-months of age.

In India, despite improvements in surgical access and increased NGO involvement, timely intervention remains inconsistent, particularly in underserved rural areas. Historical reliance on internal registry data limits transparency and reproducibility of reported trends. Therefore, this study evaluates the status of cleft surgery timing in India using only information from validated institutional and regional sources.

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METHODS

Data Sources

This analysis incorporated information from studies conducted in Sub-Himalaya (Dvivedi *et al.*¹), Himachal Pradesh (Diwana *et al.*²), Tamil Nadu (Prabakaran *et al.*³), Bihar (Stewart *et al.*⁴ and Gupta *et al.*⁵), Maharashtra (Shivlani *et al.*⁶), and a national-level study (TISS Smile Train Report⁷). Additionally, institutional data from AIIMS Patna covering May 2024 to May 2025 was included. Institutional data from AIIMS Patna (May 2024–May 2025).

Inclusion Criteria

Sources were included if they reported either the mean or median age at primary cleft lip and/or palate surgery and the proportion of on-

time surgeries, defined as those performed within 12-months for lip repair and 18-months for palate repair. Percentage of on-time surgeries (≤ 12 months for lip, ≤ 18 months for palate). Data were summarized into a comparative table. Ages were standardized in months. On time percentages were extracted or approximated from available values.

RESULTS

Bihar

Data from Stewart *et al.* and Gupta *et al.* reflect a significant backlog and delay in cleft care within Bihar. The estimated average age at surgery for unrepaired clefts exceeds 3-years, and in institutional sources like Gupta *et al.*, the mean age at presentation was as high as 13.5 years. This delay arises from multiple compounding factors including poor nutritional indices, low maternal literacy, sociocultural stigma, and absence of functional referral and cleft screening programs in rural and semi-urban districts.

Even though initiatives like RBSK exist to screen congenital anomalies, effective follow-up and surgical linkage remain weak. Despite a high population burden, Bihar lacks dedicated cleft centers in many districts, and surgical intervention remains concentrated in a few tertiary care hubs. Without targeted health education, community-based early detection, and state-supported logistical support for travel and nutrition, cleft care timing in Bihar is unlikely to improve.

AIIMS Patna

The institutional audit from AIIMS Patna, however, presents a relatively positive deviation. The center reported a median lip repair age of 11-months and a palate repair age of 32-months. Although this does not meet global standards fully, it indicates a narrowing of the gap in comparison to regional trends. On-time surgery rates were 42%

Table 2: AIIMS Patna cleft surgery data (may 2024 – may 2025).

Cleft Type	Number of Cases	Median Age at Surgery (mo)	On-Time Surgery (%)
Unilateral Cleft Lip Only	10	10	80%
Bilateral Cleft Lip Only	4	12	75%
Cleft Lip + Palate (Unilateral)	9	14	33%
Cleft Lip + Palate (Bilateral)	5	16	20%
Isolated Cleft Palate	7	34	14%
Incomplete Cleft Lip	5	9	90%
Cleft Type	Number of Cases	Median Age at Surgery (mo)	On-Time Surgery (%)
Submucous Cleft Palate	3	48	0%

for lip repair and 14% for palate repair, substantially better than both regional and national averages.

This improvement can be attributed to structured preoperative evaluation, interdisciplinary feeding and nutritional support, and surgical prioritization protocols. With strategic support—such as mobile surgical camps, tele-consultation-driven triage, and enhanced public awareness—higher centers like AIIMS Patna can play a leading role in decentralizing care and mentoring peripheral institutions to uplift cleft outcomes across Bihar.

Table 1: Age at surgery and on-time rates.

Region/Source	Lip Age (mo)	Palate Age (mo)	Lip ≤ 12 mo (%)	Palate ≤ 18 mo (%)
Divedi <i>et al.</i> (2012)	NA	NA	43.6%	NA
Diwana <i>et al.</i> (2019)	33.6	72	24.9%	NA
Prabakaran <i>et al.</i> (2019)	36	36	NA	NA
Stewart <i>et al.</i> (2016)	37	77	34%	18%
Gupta <i>et al.</i> (2024)	162	NA	NA	NA
Shivlani <i>et al.</i> (2023)	NA	NA	NA	NA
TISS Report (2015)	86.4	120	15%	10%
AIIMS Patna (2024–25)	11	32	42%	14%

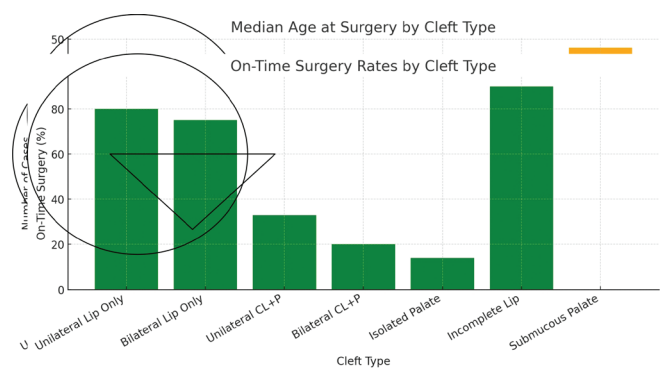


Figure 1: Median age at Surgery by Cleft type.

DISCUSSION

This multi-regional analysis confirms that delayed cleft lip and palate (CLP) surgery remains a significant public health concern in India. Although some institutions have achieved better outcomes, the average ages for cleft lip and palate surgeries across regions still significantly exceed the recommended global benchmarks of 12 and 18-months, respectively.

For Bihar, AIIMS Patna stood out with comparatively better timing, achieving a median age of 11-months for lip repair and 32-months for palate repair. These figures, though not fully aligned with international standards, reflect a narrowing treatment gap when compared to national data such as the TISS Smile Train report (lip: 86.4 months; palate: 120-months). Furthermore, AIIMS Patna demonstrated higher on-time surgery rates— 42% for lip repairs and 14% for palatal repairs—compared to the TISS data (15% and 10%, respectively).

The broader dataset reveals that many Indian children with cleft anomalies undergo their first surgeries well beyond the functional windows critical for speech, feeding, and psychosocial integration. For instance, Gupta *et al.* (2024) reported a mean age of 162-months (13.5 years) at surgery in backlog populations, while Stewart *et al.* found that only 34% of patients in Bihar underwent timely lip repairs. These delays are not solely attributable to a lack of surgical infrastructure but reflect multifactorial challenges, including poor maternal nutrition, inadequate neonatal screening, low health literacy, and sociocultural stigma.

The situation in Bihar underscores the need for targeted interventions. Despite its large population and healthcare challenges, Bihar has yet to establish a comprehensive statewide program for early cleft detection and referral. As evidenced by the significantly better metrics from AIIMS Patna, high-volume tertiary centers can act as regional cleft care hubs. By incorporating community health worker networks, early nutritional support, and outreach programs, these institutions can decentralize care and build regional capacity.

Another major finding is the disparity in outcomes based on cleft type. AIIMS Patna data revealed the highest on-time surgery rate for incomplete cleft lips (90%) and the lowest for submucous cleft palates (0%). This suggests that visually obvious deformities prompt earlier presentation, whereas subtler or internal defects like isolated or submucous palates are often missed during initial evaluations. This further supports the need for routine neonatal oral screening and provider education.

The findings highlight a pressing need for national policy realignment to integrate cleft care into broader maternal-child health initiatives. Establishing performance benchmarks for district hospitals, embedding cleft detection into routine neonatal examinations, and linking nutritional rehabilitation with surgical timelines could significantly reduce delays. NGO participation, while crucial, must

be complemented by state-supported systems to ensure sustainability.

In conclusion, India continues to face challenges in delivering timely cleft surgery. However, institutional examples like AIIMS Patna show that systemic improvements, even in high-burden regions, are possible. Prioritizing prenatal nutrition, public awareness, referral integration, and decentralization of services can accelerate progress towards equitable and timely cleft care.

CONCLUSION

Despite isolated successes, cleft repair in India is frequently delayed beyond recommended windows. Structured intervention through prenatal education, strengthened referral systems, and decentralized surgical units is urgently needed to achieve timely and equitable cleft care.

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