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Case Report

Cleft Surgery at Ship Hospital in Remote Island: Reflections and Experiences

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ABSTRACT

Introduction: Cleft lip with or without cleft palate requires timely surgical management to optimize feeding, speech development, and facial growth. In archipelagic regions, geographic isolation and limited healthcare infrastructure may delay access to specialized cleft care. Hospital ship–based outreach programs have emerged as an alternative strategy to deliver surgical services to underserved island communities. This report presents a descriptive case series of cleft lip repairs performed during a hospital ship mission in remote islands of South Sulawesi, Indonesia.

Case Presentation: Two patients with untreated cleft lip deformities were identified during surgical screening conducted as part of a hospital ship outreach mission. Both presented in adolescence or adulthood after prolonged delays in accessing definitive treatment. Cleft lip repair using a modified Millard rotation–advancement technique was performed under general anesthesia. Early postoperative outcomes were assessed based on surgical complications and scar evaluation. Postoperative follow-up was limited to 7 days.

Conclusion: Hospital ship–based cleft lip repair may represent a feasible approach to delivering surgical care in remote island settings. However, evidence remains limited to early postoperative outcomes, and further studies with larger cohorts and standardized long-term follow-up are needed to evaluate functional and aesthetic results.

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INTRODUCTION

Cleft lip with or without cleft palate (CL/P) is among the most common congenital craniofacial anomalies worldwide and represents a major public health concern. These anomalies can significantly affect feeding, speech, hearing, facial growth, and psychosocial well-being, thereby requiring multidisciplinary and staged management from infancy to adulthood [1–3].

The global incidence of cleft lip with or without cleft palate varies geographically and ethnically, ranging from approximately 1 in 500 to 1 in 2,500 live births, with higher prevalence reported in Asian populations [4,5]. Bilateral cleft lip, particularly when associated with cleft palate, represents a more severe phenotype and is often associated with greater functional impairment and surgical complexity [6].

There is limited published evidence describing clinical outcomes of cleft surgery performed

aboard hospital ships in archipelagic settings. In Indonesia, access to comprehensive cleft care remains limited in many rural and remote regions due to geographic barriers, shortages of specialists, and limited healthcare infrastructure [7].

Hospital ships have emerged as an innovative strategy to deliver surgical services to underserved island populations, enabling diagnosis, surgery, and early postoperative care within a single outreach mission [8]. This case series aims to describe the clinical characteristics, surgical management, and early outcomes of cleft lip patients treated during a hospital ship mission in a rural area of South Sulawesi.

CASE PRESENTATION

This case series was conducted during a hospital ship service mission aboard *Rumah Sakit Kapal Ksatria Airlangga* (RSKKA) in December 2025, which visited Sailus, Sapuka, and Bonerate Islands in South Sulawesi, Indonesia. Two patients with cleft lip deformities were identified during surgical screening in the clinic. Both patients underwent preoperative evaluation, including physical examination, basic laboratory tests, and anesthetic assessment. All procedures were performed under general anesthesia with oral endotracheal intubation.

Case 1

A 14-year-old girl presented with complete bilateral cleft lip and palate. The patient had never previously sought medical treatment at a hospital for these complaints. Preoperative evaluation included physical examination, laboratory testing, and anesthetic assessment. The patient was classified as American Society of Anesthesiologists (ASA) physical status I and was considered suitable for surgery under general anesthesia. Prophylactic intravenous cefazolin was administered prior to incision.

The patient underwent first-stage cheilorrhaphy using a modified Millard rotation–advancement technique on December 9, 2025. The procedure was performed under general anesthesia with oral endotracheal intubation. The operative duration was approximately 85 minutes, with a total anesthesia time of about 120 minutes. Estimated intraoperative blood loss was minimal (<50 mL), and no intraoperative complications were encountered.

Early postoperative outcomes were assessed based on the presence of surgical complications, including wound infection, hematoma, and wound dehiscence, following standard postoperative complication reporting, such as the Clavien–Dindo classification. Early scar evaluation was using the Vancouver Scar Scale (VSS), which assesses scar vascularity, pigmentation, pliability, and height.

On postoperative day two, the surgical wound appeared clean, with no active bleeding, fever, hematoma, or signs of infection, and minimal edema was observed. Examination of the upper labial region demonstrated well-approximated sutures without wound separation. Based on early clinical assessment, the surgical incision demonstrated with minimal vascularity and normal scar contour, corresponding to a VSS score of 1, indicating satisfactory early wound healing.

The patient was subsequently discharged with instructions for continued wound care and scheduled follow-up at the local primary healthcare center. At the follow-up visit on December 16, 2025 (postoperative day seven), the upper labial wound demonstrated good healing with no bleeding, edema, or signs of infection. The early scar appearance remained favorable, with a low Vancouver Scar Scale score, consistent with uncomplicated postoperative recovery (Figure 1).

Case 2

An 18-year-old man presented with a history of unilateral cleft lip and a complaint of tooth eruption into the nasal cavity (Figure 2). The patient had previously undergone cleft lip surgery during an earlier hospital ship mission to Bonerate Island at a younger age, but had never returned for postoperative follow-up at a hospital.

Preoperative evaluation included physical examination, routine laboratory testing, and anesthetic assessment. The patient was classified as American Society of Anesthesiologists (ASA) physical status I and was considered suitable for surgery under general anesthesia. Prophylactic intravenous cefazolin was administered prior to incision.



Figure 1. 14-year-old girl with complete bilateral cleft lip and palate

A revision cheilorrhaphy using the modified Millard technique combined with tooth extraction was performed. The procedure was conducted under general anesthesia with oral endotracheal intubation. The operative duration was approximately 75 minutes, with a total anesthesia time of about 110 minutes. Estimated intraoperative blood loss was minimal (<50 mL), and no intraoperative complications were observed.

Early postoperative outcomes were assessed based on the presence of surgical complications, including wound infection, hematoma, and wound dehiscence, following standard postoperative complication reporting frameworks such as the Clavien–Dindo classification. Early scar evaluation was performed using the Vancouver Scar Scale (VSS), which assesses scar vascularity, pigmentation, pliability, and height.

On postoperative evaluation, the surgical site demonstrated good approximation of the lip segments without evidence of hematoma, infection, or wound dehiscence. The patient tolerated oral intake without difficulty. Early scar assessment showed minimal vascularity and normal scar contour, corresponding to a Vancouver Scar Scale score of 1, which was consistent with satisfactory early wound healing.

Postoperative follow-up after suture removal in this patient was limited due to difficulties in maintaining contact, reflecting the challenges of long-term monitoring in remote island populations.

Ethics

According to the ethical guidance for case reports provided by the Committee on Publication Ethics (COPE), institutional ethical review is generally not required for single or small case reports if does not involve prospective research protocols or experimental interventions.



Figure 2. An 18-year-old Man with a History of Unilateral Cleft Lip



Figure 3. Surgical Procedure Performed in a Floating Hospital Operating Room.

Therefore, formal institutional ethical approval was not required for this report.

Written informed consent was obtained from the patients for the use of their clinical information and photographs for publication purposes. The hospital ship mission was conducted under the governance framework of Rumah Sakit Kapal Ksatria Airlangga, which operates as a licensed healthcare service program providing outreach medical services to remote island communities in Indonesia.

DISCUSSION

This case series explores the role of hospital ship–based cleft lip surgery in improving access to specialized surgical care in remote island settings (Figure 3). This report illustrates how geographic and systemic barriers shape cleft care delivery in archipelagic regions and highlights practical strategies for addressing unmet surgical needs in resource-limited environments.

Clinical Outcomes

Cleft lip repair using the modified Millard rotation–advancement technique was successfully performed in two patients during a hospital ship mission without intraoperative or early postoperative complications. Early postoperative evaluation demonstrated wound healing without hematoma, infection, or wound dehiscence, and early scar assessment using the Vancouver Scar Scale showed low scores in both patients. The modified Millard rotation–advancement technique remains one of the most widely used surgical approaches because it reduces tension across the reconstructed orbicularis oris muscle and improves symmetry of the prolabium and nasal tip [9,10]. Previous studies have also demonstrated that cleft lip surgery can be safely performed in outreach or resource-limited settings when standardized protocols and experienced surgical teams are available, with complication rates comparable to those reported in conventional hospital environments [9-12].

The outcomes observed in the present cases should also be interpreted within the context of established cleft management guidelines. Standard treatment protocols recommend primary cleft lip repair within the first 3–6 months of life, followed by cleft palate repair between 9 and 18 months, in order to optimize speech development, facial growth, and long-term functional outcomes [15,16]. Early surgical intervention has been shown to reduce the severity of secondary deformities and improve long-term rehabilitation outcomes. However, delayed presentation remains common in rural and geographically isolated regions where access to specialized surgical services is limited, as illustrated by the adolescent and adult patients encountered during this outreach mission.

In older patients, cleft reconstruction may present additional technical challenges related to wider cleft dimensions, decreased tissue elasticity, and increased closure tension compared with repairs performed during infancy. These factors may contribute to higher complication rates, including palatal fistula formation and less favorable speech outcomes in delayed palatal repair [16,17].

Logistical Considerations in Ship-Based Surgery

Delivering surgical care aboard a hospital ship involves unique logistical considerations related to limited infrastructure, operative time, and postoperative follow-up capacity. Outreach surgical programs, therefore, require careful patient selection and coordination between surgical, anesthetic, and nursing teams to ensure patient safety. Quality assurance standards for cleft outreach programs emphasize the importance of appropriate perioperative assessment, standardized surgical protocols, and adequate postoperative monitoring in order to maintain surgical safety in low-resource environments [9].

In the present mission, the hospital ship functioned as a mobile surgical platform that enabled patient screening, anesthesia services, and cleft lip repair within a single outreach visit, demonstrating the feasibility of providing specialized surgical care in geographically isolated communities.

Comparison with Existing Outreach and Global Surgery Literature

Several studies have reported the effectiveness of outreach surgical programs in addressing untreated cleft deformities in underserved populations. Aziz et al. described cleft surgery outreach programs in rural Bangladesh and reported that well-organized surgical missions can provide safe and effective treatment for patients who otherwise lack access to specialized care [12]. Similarly, global surgery research has emphasized that innovative service delivery models are necessary to reduce disparities in access to surgical services. The Lancet Commission on Global Surgery highlighted that strengthening surgical systems and improving access to essential surgical

care are key components of achieving universal health coverage, particularly in low and middle-income countries with limited specialist distribution [14]. In this context, hospital ship programs may serve as complementary strategies for expanding access to specialized surgical services in remote island settings.

Limitations

Several limitations should be acknowledged in this report. First, the sample size is small (n = 2), which limits the ability to generalize the findings. Second, postoperative follow-up was limited to early evaluation within seven days, preventing assessment of long-term outcomes such as scar healing, nasal symmetry, speech development, or the need for secondary procedures. Third, although early scar appearance was assessed, no long-term aesthetic evaluation or patient-reported outcome measures were available. Future studies involving larger patient cohorts and longer follow-up periods are necessary to better evaluate the long-term functional and aesthetic outcomes of cleft surgery performed in mobile outreach settings.

Taken together, these reflections highlight how non-clinical factors such as geography, health system capacity, and access pathways strongly influence cleft care delivery in remote island settings. In Indonesia, the uneven distribution of specialized surgical services across an extensive archipelago results in many patients presenting well beyond the recommended age for intervention, particularly in rural and underserved communities [7,8,12]. Within this context, hospital ship-based programs function as critical access strategies that bridge tertiary surgical expertise and geographically isolated populations. By bringing safe and timely surgical care closer to patients' homes, these programs reduce logistical burdens and address congenital deformities that would otherwise remain untreated [8,13,14].

Prioritizing cleft lip repair as the initial intervention addresses the most visible and socially impactful deformity, providing immediate functional and psychosocial benefits while establishing a foundation for potential future comprehensive care. This approach aligns with global surgery principles that emphasize context-sensitive decision-making and the prioritization of safe, high-impact interventions in resource-limited and geographically isolated settings [14].

CONCLUSION

Hospital ship–based cleft lip repair in remote island settings appears feasible and safe in the short term. However, evidence remains limited to early postoperative outcomes. Larger prospective studies with standardized follow-up are required to evaluate long-term functional and aesthetic results and to define the sustainable role of mobile surgical platforms in cleft care.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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