Impact of Geopolitical Unrest on Surgical Delays and Outcomes in Immigrant Populations With Cleft Lip and Palate

Şeyda Güray, MD, Nuh Evin, MD,† Melih K. Sifil, MD,‡ Kemalettin Yıldız, MD,† and Ethem Güneren, MD§*

Background: Geopolitical conflicts in the Middle East have led to mass migrations, with Turkey becoming a major host country. This influx has strained the health care system, particularly regarding specialized care for conditions like cleft lip and palate (CLP). Timely intervention is crucial for optimal outcomes, but cultural, socioeconomic, and logistical barriers often cause delays, impacting physical, functional, and psychosocial development.

Methods: This retrospective study analyzed 72 immigrant pediatric CLP patients treated in Turkey between 2012 and 2022. Data on demographics, medical history, surgical interventions, complications, and treatment delays were collected. Surgical timing was compared with American Cleft Palate Craniofacial Association guidelines, and the impact of socioeconomic status on delays was assessed.

Results: Seventy-two patients underwent a total of 91 surgical interventions, including 29 cleft lip repairs, 22 cleft palate repairs, 6 pharyngeal flaps, 15 fistula closures, 8 corrections of secondary lip scars and whistling deformities, and 11 alveolar bone graftings. A majority (73.6%) had poor socioeconomic status. The average delays for cleft lip, cleft palate, and alveolar bone grafting surgeries were 5.3 ± 4, 7.3 ± 6.1, and 34.1 ± 23.5 months, respectively, and were significantly longer for patients with poor socioeconomic status ($P = 0.00502$, 0.030741, and 0.041878). The average delay for pharyngeal flap surgery, performed in patients with poor socioeconomic status (except for one), was 43.7 ± 14.1 months.

Conclusions: This study highlights the challenges and disparities in CLP care for immigrant children in Turkey due to geopolitical conflict. While surgical complication rates are similar to established data, delays in treatment, especially among those with lower socioeconomic status, are a significant concern. The findings emphasize the need for comprehensive, culturally sensitive care and systemic interventions to improve access and outcomes for this vulnerable population.

Key Words: Cleft lip and palate, geopolitical conflict, health care access, immigrant, refugee, socioeconomic status, surgical outcomes, treatment delay, Turkey

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The Middle East has long been a region marked by geopolitical unrest and armed conflicts, triggering mass migrations toward areas offering safety and basic human rights.[1–4] Turkey, strategically situated at the crossroads of continents, has become a prominent destination for asylum seekers due to its geographical proximity, cultural and religious ties, and policies ensuring access to essential services such as shelter, education, and health care.[1–4] The outbreak of war and civil unrest in Syria on March 15, 2011, and its subsequent spread to Iraq and neighboring countries, has significantly intensified the influx of immigrants into Turkey.[1] This demographic shift, while enriching the nation's cultural diversity, has placed immense pressure on various sectors, including the economy, education, employment, and most notably, the health care system.[1–4]

Although efforts have been made to address the general health care needs of immigrants, specialized surgical interventions, particularly those required for orofacial clefts (CLP), warrant closer examination.[4] Effective CLP treatment, essential for optimal facial form, function, speech, and hearing development, necessitates timely interventions guided by a multidisciplinary approach.[5] However, cultural differences, socioeconomic factors, language barriers, the transient nature of refugee populations, and associated psychosocial issues often contribute to significant treatment delays.[5] These delays can impede social integration due to challenges in facial esthetics, speech articulation, regurgitation, recurrent ear infections, and hearing impairments.[5]

This study aims to address this knowledge gap by investigating the impact of geopolitical conflicts on the management and outcomes of cleft lip and palate surgeries within vulnerable

From the *Department of Plastic, Reconstructive, and Aesthetic Surgery, Faculty of Medicine, Marmara University; †Department of Plastic, Reconstructive, and Aesthetic Surgery, Faculty of Medicine, Bezmialem Vakıf University, Istanbul, Turkey; ‡Stanford Plastic Surgery, Stanford University, Palo Alto, CA; and §Private Practice, Istanbul, Turkey.

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Address correspondence and reprint requests to Melih K. Sifil, MD, Stanford Plastic Surgery, Stanford University, 1000 Welch Road, Palo Alto 94304, CA; E-mail: sifil@stanford.edu

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immigrant populations. By adopting a multidisciplinary perspective, this research will explore the diverse factors—ranging from health care accessibility to adherence to treatment protocols—that exacerbate the complexities of managing orofacial clefts among these groups. The findings of this study will not only contribute to the existing literature but also inform strategies to enhance the quality of care and improve outcomes for individuals with CLP in the context of geopolitical instability.

METHODS

This retrospective study analyzed 72 immigrant patients presenting with cleft lip and palate (CLP) deformities between January 2012 and May 2022. Exclusion criteria included patients undergoing cleft lip nose or orthognathic surgery, those without surgical treatment, or those with <12 months of follow-up (Supplemental Table 1, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

Data collection encompassed patient demographics (age, sex, and nationality), family history of CLP, concurrent medical conditions and anomalies, anthropometric measurements, socioeconomic status, cleft deformity type and severity, surgical interventions, and postoperative outcomes. Surgical timing was assessed against benchmarks recommended by the American Cleft Palate-Craniofacial Association.[6] Geopolitical factors, including conflicts and migration status, were explored for their impact on health care access and treatment delays. Informed consent was obtained from all participants or their guardians, and the study adhered to the Declaration of Helsinki, with approval from the local ethics committee (approval no: 2024/104).

Initial Examination

A multidisciplinary team conducted comprehensive medical and family history evaluations. Pediatricians assessed growth, nutrition, feeding disorders, and motor, cognitive, and social development, enrolling patients in routine pediatric care and immunization programs. Mothers received breastfeeding support and training on feeding techniques. ENT specialists assessed hearing and ear health, while speech therapists evaluated speech and language development. Orthodontists planned nasoalveolar molding for infants aged 3 months or below, and genetic consultations were arranged for 5 syndromic patients and 8 with a family history of CLP. Specialists performed neurological, cardiological, ophthalmic, urogenital, gastrointestinal, and psychological assessments. Dentists provided oral hygiene training, conducted routine dental checks, and treated 17 patients with procedures such as caries treatment, fillings, and extractions. Surgeons used techniques like Tennison's and Millard's for unilateral cleft lips, Cutting's for bilateral clefts, and 2-flap palatoplasty for cleft palates, using iliac bone grafts for alveolar bone reconstruction and 2 local palate flaps or 2-flap palatoplasty for fistula management. ENT specialists placed ear tubes concurrently with palatoplasty when necessary. The research team quantified and analyzed treatment delays and contributing factors, such as health care access, financial limitations, and logistical challenges, within the context of geopolitical unrest.

Surgical Treatments

Surgeons used Tennison's and Millard's techniques for unilateral cleft lips, Cutting's technique for bilateral clefts, and 2-flap palatoplasty for cleft palates. They used iliac bone grafts for alveolar bone grafting. For fistula management, they used 2 local palate flaps or 2-flap palatoplasty. ENT specialists placed ear tubes concurrently with palatoplasty when necessary.

Statistical Analysis

Statistical analysis was performed using SPSS version 22 software for Windows (IBM Corporation, Armonk, NY). Independent t tests assessed the association between socioeconomic status and surgical delay. With 95% CIs, P-values <0.05 were considered statistically significant.

RESULTS

Our study cohort comprised 72 pediatric patients with cleft lip and/or palate deformities. The distribution of cleft types was as follows: 43 unilateral cleft lip and palate, 13 bilateral cleft lip and palate, 11 isolated cleft lip, and 5 isolated cleft palate (Supplemental Table 2, Supplemental Digital Content 1, http://links.lww.com/SCS/G768). The cohort consisted of 41 females and 31 males, with an average age of 5.3 ± 4.6 years.

Eight patients reported a family history of cleft lip and/or palate. Five patients were identified with syndromic CLP, including 2 with Van der Woude syndrome, 1 with Pierre Robin sequence, 1 with velocardiofacial syndrome, and 1 with DiGeorge syndrome. These diagnoses were confirmed by genetic testing. In addition, 6 patients presented with nonsyndromic anomalies: 3 cardiovascular, 2 urogenital, and 1 extremity anomaly.

The patients' nationalities reflected their status as temporary refugees, with 47 from Syria, 12 from Iraq, 10 from Afghanistan, and 3 from Libya. Socioeconomic status was assessed, with 53 patients identified as having poor socioeconomic status (beneficiaries of the European Union-funded Social Integration Assistance program) and 19 patients having normal or good socioeconomic status (Supplemental Table 1, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

Pediatric examinations revealed underlying health issues in some patients. Six patients presented with viral upper respiratory tract infections, 2 with diarrhea and viral intestinal infections, and 3 with urinary tract infections. Notably, 10 of the 11 patients with infections were from the low socioeconomic status group. Furthermore, 13 patients with low socioeconomic status lacked vaccinations and were subsequently enrolled in a vaccination program. Anemia (hemoglobin <10 g/dL) was diagnosed in 5 patients, 4 of whom had low socioeconomic status. In addition, 16 patients (14 with low socioeconomic status) had body weights below the 25th percentile, and 17 patients (14 with low socioeconomic status) had heights below the 25th percentile, indicating stunted growth, a common issue in conflict-affected populations (Supplemental Table 7, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

Among the 14 patients indicated for nasoalveolar molding (NAM) treatment, only 8 received it. Speech therapy was notably underutilized, with only 2 patients receiving it.

A review of past surgical interventions revealed that the patients had collectively undergone 83 surgeries before their inclusion in this study, encompassing 38 cleft lip repairs, 39 cleft palate repairs, 3 alveolar bone grafting, 1 pharyngeal flap for velopharyngeal insufficiency, and 2 fistula repairs (Supplemental Table 2, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

The average time from initial admission to surgery was 19.2 ± 11.3 days, with delays often attributed to the need to address infections, anemia, and growth concerns. During the study period, a total of 91 surgical interventions were performed on the 72 patients. These included 29 cleft lip repairs, 22 cleft

palate repairs, 6 pharyngeal flaps, 15 fistula closures, 8 corrections of secondary lip scars and whistling deformities, and 11 alveolar bone grafting (Supplemental Table 3, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

Analysis of surgical delays revealed a significant association with socioeconomic status. The average delay for cleft lip surgery was 5.3 ± 4 months overall, but it was significantly longer for 21 patients with poor socioeconomic status (6.5 ± 3.9 mo) compared with 8 patients with normal or good socioeconomic status (2.4 ± 2.3 mo; $P = 0.00502$). Similarly, the average delay for cleft palate surgery was 7.3 ± 6.1 months overall, with a statistically significant difference between 16 patients with poor socioeconomic status (8.8 ± 6.4 mo) and 6 patients with normal or good socioeconomic status (3.3 ± 2.8 mo; $P = 0.030741$) (Supplemental Table 4, Supplemental Digital Content 1, http://links.lww.com/SCS/G768). The average delay in pharyngeal flap surgery for velopharyngeal insufficiency was 43.7 ± 14.1 months, with 5 of 6 patients having poor socioeconomic status.

Alveolar bone grafting also showed a significant delay associated with socioeconomic status. The average delay was 34.1 ± 23.5 months overall, but it was considerably longer for 7 patients with poor socioeconomic status (43.3 ± 23.1 mo) compared with 4 patients with normal or good socioeconomic status (18 ± 14.9 mo; $P = 0.041878$).

Early postoperative complications were observed in 15 patients (20.8%), with fever being the most frequent (10 patients,13.9%), followed by respiratory tract infections (3 patients, 4.2%), and localized palatal wound dehiscence (2 patients, 2.8%) (Supplemental Table 5, Supplemental Digital Content 1, http://links.lww.com/SCS/G768). Two of the patients with respiratory tract infections required 2 days of pediatric intensive care due to postoperative respiratory distress but recovered without further complications.

Late postoperative complications occurred in 3 patients (4.2%). One patient developed a superficial infection at the iliac bone donor site, and 2 patients developed hypertrophic scars on the cleft lip scar (Supplemental Table 6, Supplemental Digital Content 1, http://links.lww.com/SCS/G768).

Symptomatic fistulas developed in 3 out of 22 patients (13.6%) who underwent primary cleft palate repair. Two of these cases were associated with early postoperative palatal dehiscence. Among the 15 patients who underwent fistula repair, 3 experienced fistula recurrence (20%) (Supplemental Table 7, Supplemental Digital Content 1, http://links.lww.com/SCS/G768). Two of these recurrences were successfully closed using palatal flaps, and 1 was closed with 2-flap palatoplasty. All recurrent fistulas were ultimately closed without further complications after 6 months.

All patients were followed up for an average of 49.2 ± 25.7 months after their surgical procedures.

DISCUSSION

Cleft lip and palate (CLP), affecting ~1 in 1000 live births,[7,8] are the most common congenital malformations of the head and neck. Their severity ranges from minor notches or bifid uvula to extensive clefts involving the nasal base, upper lip, alveolar arch, and palate. While minor forms may not significantly impact function and allow flexible treatment timing, severe CLP necessitates immediate, comprehensive, multidisciplinary care to achieve optimal esthetic and functional outcomes.[9–11] Such care is crucial for normal physical, mental, and social development, societal integration, and overall quality of life.

Significant delays in CLP surgery are often attributed to health care access barriers due to war, financial constraints, and logistical challenges.[12] These delays have been studied to assess their impact on treatment outcomes and complications. The management of orofacial clefts in immigrant populations requires a comprehensive approach addressing various obstacles, from disrupted health care systems to socioeconomic barriers.

These challenges are particularly acute for individuals displaced by conflict, such as Syrian refugees, who experience higher rates of stunted growth and significant health care access barriers.[1,3,4] Conflicts in the Middle East have been linked to an increased incidence of orofacial clefts, suggesting that conflict-related environmental stressors may play a role.[2] Geographical disparities further exacerbate these issues. In West African subregions, social and logistical barriers hinder treatment compliance, underscoring the need for more accessible and affordable surgical options.[13] Similarly, in resource-limited settings like Uganda, delays in primary palatal closure have resulted in suboptimal speech outcomes in older children and young adults.[5] Health care access inequities extend beyond high-conflict or impoverished areas; even in low-income and middle-income countries, delays in cleft palate repair are common, significantly impacting individuals' well-being.[12]

While the American Cleft Palate-Craniofacial Association recommends repairing cleft lip and palate deformities by the 12th and 18th months of age, respectively,[6] delays are prevalent in underdeveloped societies, among individuals with low socioeconomic status, and within certain religious groups.[12,13] Recent years have seen additional delays due to pandemics like COVID-19 and natural disasters.[14–16]

In underdeveloped countries, delays in surgical repair for CLP are pronounced.[13] A study by Conway et al[17] across 33 African countries from 2001 to 2011 found the average age at surgery to be significantly above recommended guidelines, with variations based on the type of cleft. War and political conflicts limit resource availability, delaying aid and health care services. Migrants and refugees face additional barriers due to camp conditions and challenges in host countries, including cultural, socioeconomic, and language issues.[18]

Boynuyogun et al[1] conducted a study of 68 Syrian refugee cleft lip and palate patients in Turkey. The study found significant delays in cleft lip and palate repairs compared with nonrefugee populations. The average age at cleft lip repair was 7.6 months (ranging from 3 to 84 mo), and the average age at cleft palate repair was 28.7 months (ranging from 6 to 180 mo). It is important to note that this study was limited to a homogeneous group of Syrian refugees and did not assess nutritional and socioeconomic status or early postoperative complications. Our study includes a more heterogeneous and extensive patient group from a broader geographical area. In addition to barriers to accessing surgery, our study investigated the impact of metabolic problems on surgical delays, finding an average delay of 19.2 ± 11.3 days, attributed to issues such as infections, anemia, and growth concerns. Furthermore, our study also evaluated surgical delays for velopharyngeal insufficiency and alveolar bone grafting. This comprehensive approach allows for a more detailed understanding of the multifaceted challenges faced by our patient population.

Furthermore, exposure to environmental toxins during pregnancy, a potential consequence of war, has been linked to cleft palate and other congenital anomalies. Studies estimate that cleft lip and/or palate may occur in up to 7 per 1000 births in populations exposed to environmental toxins.[19] This aligns with findings from studies conducted after the Iran-Iraq war (1980–1988) and the Islamic State war in Iraq (2014–2017),

which documented a significant increase in CLP incidence following these conflicts. The reported increase in CLP incidence ranged from 1 per 1000 births to 4 per 1000 births, and these increases are attributed to the wars' environmental impact, including chemical exposure and radiation.[2,20] These factors, which may be more prevalent among refugee populations, could contribute to poorer developmental outcomes and a greater need for interventions like alveolar bone grafting, which is used to create a foundation for a prosthetic speech aid or to improve velopharyngeal closure.

Regarding surgical complications, the literature indicates that early postoperative complications vary, but no significant difference has been found between refugee and nonrefugee populations. Sutcu and colleagues reported ~19% early complications in 328 primary cleft lip and palate surgeries, with 8% being minor (eg, fever, partial wound separation, temporary hypothermia) and 11% major (eg, respiratory tract infection, airway obstruction, excessive bleeding, complete wound dehiscence).[21] Our study aligns with these findings, demonstrating a 20.8% rate of early complications, including 16.6% minor and 4.2% major complications. Notably, fever was the most common early complication, occurring in 13.9% of cases. The rate of late postoperative complications was observed at 4.2%, consistent with literature data,[21] suggesting that delays in surgical repairs may not significantly impact the rate of complications among immigrant patients.

Fistula formation, a common late postoperative complication following palate surgery, has been reported in 0% to 34% of primary repairs.[22,23] Recurrence rates after fistula repair in cleft lip patients range between 22% and 33%, depending on the fistula's location and the surgical technique used.[23,24] Boynuyogun et al[1] found a 26.2% fistula rate after palate repair in the refugee population. In our study, the fistula rate was 14.3% among patients undergoing primary palate repair, with a recurrence rate of ~20% in fistula repair cases. These rates are comparable to those reported in the general CLP population, further suggesting that delays in surgical intervention may not substantially affect the incidence of fistulas in immigrant patients.

Managing orofacial clefts in immigrant and refugee populations presents unique challenges that necessitate a comprehensive, patient-centered approach.[1,4] While our study suggests that the rate of complications following cleft lip and palate repair is comparable between immigrant and nonimmigrant populations, the impact of delayed surgical intervention on long-term functional and psychosocial outcomes remains an important area for further investigation.[1,4,5] Studies have shown that delays in surgery can negatively impact speech development, facial growth, and social integration.[5,17]

A collaborative effort from health care providers, policymakers, and community organizations is essential to address the multifaceted barriers to timely and effective care for these vulnerable populations.[3,4,12] This approach should focus on improving health care access, providing culturally sensitive care, and implementing strategies to mitigate the impact of socioeconomic and environmental factors on the development and treatment of orofacial clefts.[3,4,12,13] Ultimately, the goal is to ensure that all individuals with CLP, regardless of their background or circumstances, receive the comprehensive care necessary to achieve optimal outcomes and lead fulfilling lives.

Advantages of the Study

This research provides valuable insights into both early and late postoperative complications following cleft lip and palate repairs among migratory populations, offering a comparison with established patient data within existing literature. This contributes to our understanding of the unique challenges and outcomes in this population.

Limitations of the Study

The study has several limitations. It did not examine the broader impact of patient care on the health care system, such as treatment costs, nor did it encompass a sufficiently long study period to capture long-term outcomes related to speech development, maxillary growth, social integration, education, and employment. In addition, the study did not compare the physical and functional outcomes of patients who underwent late repairs with those treated within conventional timeframes. These limitations are partly due to the difficulties of maintaining long-term follow-up with a patient group prone to frequent relocation.

CONCLUSION

In light of our findings, it becomes evident that addressing the needs of CLP patients in immigrant and vulnerable populations requires a multifaceted approach that transcends medical interventions alone. The health care system must evolve to become more inclusive and adaptable, ensuring equitable access to comprehensive care that considers the unique medical, environmental, and sociocultural circumstances of each individual. This includes advocating for systemic changes that emphasize capacity building, education, and policy reforms to mitigate the barriers to effective treatment.

This study highlights the intricate challenges of managing orofacial clefts amid geopolitical unrest, contributing valuable insights to the existing literature and calling for concerted efforts to bridge the gap in health care access. Ensuring timely and adequate care for immigrant populations affected by conflicts in the Middle East is not only a medical necessity but also a fundamental step toward upholding the rights and dignity of every individual in need. By addressing the root causes of health care disparities and working collaboratively to provide comprehensive care, we can strive toward a future where every child with CLP, regardless of their circumstances, has the opportunity to thrive.

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