

A Model Humanitarian Cleft Mission: 312 Cleft Surgeries in 7 Days

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Background: There are many countries in the world where patients with cleft lip and palate cannot get access to specialized cleft care units. Cleft missions play an important role in providing surgical care to the areas of the world with limited resources. This article presents a model of cleft missions that can be adopted in many countries where expertise is available but resources are limited. Through proper utilization of local human resource, this type of mission can be a cost-effective and robust way of treating patients with cleft in countries with approximately 52% of the world's population.

Methods: We present a case series of patients of one of our cleft missions carried out in Khairpur, Pakistan, in March 2014 over a period of 7 days. Specific details concerning the organization of mission, gathering of patients, preparation for surgery, and carrying out surgical procedures in a safe and swift manner are presented.

Results: A total of 312 patients were operated on in 7 days. There were 145 patients with cleft lip and 167 patients with cleft palate. There were 187 male and 125 female patients with mean age of 7 years. Contemporary operative techniques were utilized to repair different types of cleft lip and palate. Of 167 patients, only 16 developed fistula.

Conclusion: A locoregional cleft team can be more effective to care for the patients with cleft in countries where surgical and other expertise can be utilized by proper organization of cleft missions on a national level. (*Plast Reconstr Surg Glob Open* 2015;3:e313; doi: 10.1097/GOX.0000000000000282; Published online 2 March 2015.)

With advancements in the field of medical science, many untreatable congenital anomalies have become amenable to surgical

reconstruction. A major difference between the developed, developing, and underdeveloped countries is the provision of advanced healthcare facilities. In the modern world, specific set protocols are in place for management of patients with cleft lip and palate, whereas there are many regions in the world which are still deprived of basic facilities for cleft care.¹ In such areas, the need for integrated cleft care teams becomes paramount for poor patients with cleft lip and palate. Every year more than 160,000 new patients with cleft lip and palate are born in the whole world.² Pakistan ranks fourth in the world (after China, India, and Indonesia) having the highest number of cleft children born every year.³ A cleft mission is a program/project that provides proper optimal care and delivers safe surgeries at remote sites in the developing and un-

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derdeveloped regions of the world.⁴ It helps to immediately fix the cleft lip and palate problems of a high number of patients in a short period of time, transforming them from the disabled to enabled members of the society.⁵ Various organizations all over the world are carrying out cleft missions in such countries, but channelizing their efforts to get maximum benefit of the endeavors is the need of the hour.

Since 2004, our team has conducted 130 cleft missions, including 4 international missions. The first mission comprised 5 team members, which included 2 surgeons, 2 operating room (OR) assistants, and 1 coordinator, and a total of 63 cleft surgeries were performed in a short span of 7 days. Ever since, the team has been regularly operating upon patients with cleft at different hospitals in remote areas of Pakistan and Afghanistan. Over the years, the team evolved and grew in size through training and induction of new team members in surgery, anesthesia, OR, recovery, nursing care, and follow-up departments. Procedures and protocols have also been developed resulting in improved surgical outcomes and more cost-effectiveness.

This article presents a model of a cleft mission for performing quality surgical procedures within limited period of time. This model can be easily adopted in countries where surgical expertise and ancillary services are available, but the burden of cleft lip and palate is quite significant. Such countries represent 52.2% of the world's population⁶ and locoregional teams and, when properly developed, can adopt the presented model to effectively address the stigma of cleft deformity in a more cost-effective way as compared with routine international missions.

MATERIALS AND METHODS

Under the auspices of Cleft Lip and Palate Association of Pakistan, a cleft mission was arranged at

the Civil Hospital, Khairpur, from March 25 to April 2, 2014. Khairpur is capital of the Khairpur District in Sindh province of Pakistan. A Public Awareness Campaign was started 4 weeks in advance. Banners and posters with pictures of cleft lip and palate were affixed in adjoining districts; handbills were distributed while radio and cable TV were also used to disseminate information among the general public. Advertisements were also published in the local newspapers. A total of 467 patients with cleft reported at the outpatients' clinic who were examined by the plastic surgeon and the anesthetist according to criteria mentioned in Table 1. Patients found suitable were scheduled for surgery. This examination and screening process was carried out from March 25 to 28, 2014.

All the equipment required to set up fully functional operation theaters was brought in from cleft center in Lahore, about 300 miles away. It included operating tables, anesthesia and diathermy machines, cardiac monitors, pulse oximeters, operating instrument sets, emergency equipment, and all other necessary medicines and surgical items. The equipment and medicines were packed in wooden containers to be wheeled down into the van. Six operating tables were set up, 3 each in 2 ORs. Large-sized oxygen cylinders were connected to the anesthesia machines. Pulse oximeters and cardiac monitors were also set up for each operating table. Emergency medicine trays were always kept ready in the OR and wards as well.

The total number of personnel involved and their responsibilities are detailed in Table 2. There were 4 anesthesiologists, 2 in each room, to look after 6 operating tables. There were 5 surgeons to operate on patients with cleft. The sixth table was used to get the next patient with cleft ready. Each OR had 2 anesthesiologists, 3 surgery assistants, 1 anesthesia

Table 1. Cleft Lip and Palate Association of Pakistan's Fitness Criteria for Patients with Cleft

Age (Mo)	Normal Weight Scale (kg)	Cleft Patients' Weight Scale (kg)
<1 y	(age + 9)/2	(age + 8)/2
>1 y (1-5 y)	(age + 5)/2	(age + 4)/2
>5-14 y	(age)/4	(age)/3
Minor factors	H/o hospitalization H/o fever H/o of apneic spell H/o of diarrhea and vomiting H/o of fits	
Major factors	Pinch test to assess dehydration and activity Crying: high and low pitch associated with cyanosis Jaundice Milestones, eg, neck holding, sitting, walking, etc Syndromic look, eg, micrognathia, microsomia	
Contraindication for surgery	<50% of predicted weight 2 minor factors 1 major factor	

Table 2. Composition of the Cleft Lip and Palate Association of Pakistan Mission Team

Awareness campaign organizer	4
Outpatient's clinic staff	
Doctor	2
Speech therapist	1
Assistant	1
Surgeon	5
Anesthesiologist	4
OR staff	
Surgery assistants	6
Anesthesia assistants	2
Recovery room	2
Circulators	2
Sterilization coordinator	1
Nursing staff	4
Supporting staff	4
Record keeping	2
Total members	40

paramedic, and 1 circulating person to facilitate the team members. One paramedic was responsible for swift provision of sterilized instruments for surgery.

After the surgery was completed, the patients were immediately shifted, with the endotracheal tube attached, to the recovery area where extubation and smooth recovery was allowed. The recovery area was taken care of by a paramedic with extensive experience of over 25 years in pediatric and adult anesthesia. He was assisted by another paramedic and supervised by anesthesiologists. Meanwhile, the next patient with cleft was brought to the operating table and intubated. No time was wasted during this changeover saving at least 30 valuable minutes between 2 surgeries. To reduce fatigue and physical stress, all surgeons used adjustable chairs while operating.

Extubation in the recovery room on average takes 35 minutes. When fully in senses, the patients were shifted to the wards, where our trained nursing staff looked after them. The patients remained in the ward overnight under the supervision of a doctor from the team and discharged the next morning if the doctor deemed appropriate. Training on postoperative wound care and food restriction was administered by the specialist nurses. Patients were given 1-page instructions in the local language for postoperative care and follow-up.

Anesthesiologists and surgeons resided in a nearby hotel with travelling time less than 20 minutes while the rest of the team stayed in the hospital. Surgeries commenced at around 9:30 AM and continued

till 11:00 PM every day. Every day at the end of all surgeries, 1 surgeon and 1 anesthesiologist carried out the round of all patients operated on during the day to find and rectify any problems.

RESULTS

A total of 312 patients, both male and female, were operated on in 7 days, including 145 patients with cleft lip and 167 patients with cleft palate. The age ranged from 3 months to 69 years with a mean age of 7 years. Further details of surgeries performed are shown in Table 3. A variety of different types of primary and secondary cases of cleft lip and palate were operated on, as shown in Table 4. Contemporary techniques of repair of cleft lip and palate were applied during the surgery to obtain satisfactory results. Table 5 summarizes the surgical procedures used. Figures 1–7 show some of the preoperative and postoperative results.

On the seventh day after the surgery, sutures in patients with cleft lip were removed. Continuous skin sutures were used on the lip and nose which helped in suture removal. The team visited the local hospital 1 month later to examine the patients again, followed by a visit after 3 months. The speech therapist examined all the patients with cleft palate to guide and help for improvement in their speech. Further follow-up was planned at 6 and 12 months postsurgery.

Regarding the complications, 1 patient with cleft palate developed postoperative bleeding on the day of surgery. He was shifted to the OR, but the bleeding stopped with conservative measures; no other intervention was needed. Later this patient had an uneventful recovery. A total of 16 patients developed fistulae/dehiscence after cleft palate repair. The site and size of fistula are shown in Table 6. One patient developed unilateral dehiscence 2 days after lip adhesion for bilateral cleft lip with protruding premaxilla. He underwent resuturing of the dehiscence with uneventful recovery. There were no other complications, such as infection, pneumonia, or death.

DISCUSSION

Humanitarian medical missions temporarily overcome limitations, promote long-term solutions to the local healthcare system, and deliver immediate care to the patients in need.⁷ Especially pertaining to cleft

Table 3. Distribution of Male and Female Patients during the Mission

Date	March 27, 2014	March 28, 2014	March 29, 2014	March 30, 2014	March 31, 2014	April 1, 2014	April 2, 2014	Total
Male	29	29	26	20	33	34	16	187
Female	25	20	25	13	19	12	11	125

Table 4. Distribution of Different Types of Cleft Lip and Palate and Average Time for Repair on Different Days of Cleft Mission

Diagnosis	Average Time of Repair in (Min)	March 27, 2014	March 28, 2014	March 29, 2014	March 30, 2014	March 31, 2014	April 1, 2014	April 2, 2014	Total
Unilateral incomplete cleft lip	45	18	10	12	6	1	9	12	68
Unilateral complete cleft lip	60	6	4	7	3	3	13	6	42
Secondary unilateral incomplete cleft lip	50	—	3	2	—	—	1	2	8
Secondary unilateral complete cleft lip	60	2	—	—	1	—	—	4	7
Bilateral complete cleft lip	100	—	2	—	1	—	1	1	5
Secondary bilateral complete cleft lip	90	—	3	—	1	—	—	—	4
Bilateral incomplete cleft lip	80	1	—	—	—	2	—	2	5
Secondary bilateral incomplete cleft lip	70	—	—	—	—	—	1	1	2
Adhesion (bilateral complete cleft lip with protruding premaxilla)	40	1	—	—	1	—	2	—	4
Soft palate only	40	4	6	8	5	2	6	6	37
Complete cleft palate	60	12	10	14	7	12	8	9	72
Bilateral incomplete cleft palate	60	3	4	2	—	—	2	1	12
Bilateral complete cleft palate	90	7	5	1	3	2	4	2	24
Secondary palate with fistula	90	—	2	5	4	4	2	2	19
Pharyngeal flap in short palate	60	—	—	—	1	—	1	1	3
		54	49	51	33	26	50	49	312

care, they provide an unparalleled environment in which multidisciplinary treatment can be delivered to patients with cleft lip and palate.⁸ The cooperation of host hospitals and locally active nongovernmental organizations provides a sustainable model for providing treatment for cleft lip and palate.

Prof. Donald R. Laub founded Interplast (now Resurge) in 1969 to help poor patients in the developing countries.^{9,10} At present, many regional chapters of Resurge are providing free surgical care to the poor and needy patients around the globe. Operation Smile was founded in 1982 by William Magee and is the largest organization managing international cleft missions all over the world.¹¹

The countries of the world can be divided into 4 groups (Table 7) depending on the workload of the patients with cleft and availability and utilization of cleft services. Group A comprises developed countries like United States, Canada, United Kingdom, Ireland, Schengen countries, Japan, Taiwan, Singapore, Australia, New Zealand, and the rich countries of Middle East, which have well-developed healthcare programs/resources to take care of patients with cleft. This group makes up approximately 13% of the world's population.⁶ Group B includes the countries

like China, India, Indonesia, Brazil, Pakistan, Iran, and Thailand, where surgical expertise and ancillary services are available, but the healthcare system is not beefed enough to handle the burden of patients with cleft lip and palate. These countries comprise of 52.22% of world's population,⁶ and there is an urgent need to develop and train cleft mission teams from within the country to reduce the burden of patients with cleft. Our model cleft mission can be easily reproduced in all of group B countries. There is no language barrier between members of the team, so that coordination is better and more convenient. The local team members can easily provide follow-up at 1, 4, 12, and 24 weeks to the cleft patients operated. In our model, 1 qualified OR assistant with extensive experience in management of patients with cleft carries out the follow-up. In addition, he removes the sutures, addresses different complaints of the patients, and takes pictures as well. Continuation of care is demonstrated by the fact that any patient having both cleft lip and palate, and who has been operated on for lip or palate at one mission, can undergo second surgery after 12 or 24 weeks.

In group C are the countries like Argentina, Philippines, Bangladesh, Mexico, Vietnam, Iraq, Peru,

Table 5. Types of Surgical Procedures for Different Types of Cleft Lip and Palate

No.	Diagnosis	Procedure
1	Unilateral cleft lip (complete or incomplete)	Noordhoff technique with primary cleft rhinoplasty
2	Bilateral cleft lip (complete or incomplete)	Modified Noordhoff technique with primary cleft rhinoplasty
3	Bilateral complete cleft lip with protruding premaxilla	Bilateral lip adhesion
4	Cleft of soft palate	Von Langenbeck repair with levator dissection and retroposition
5	Bilateral incomplete cleft palate	Von Langenbeck repair with levator dissection and retroposition
6	Unilateral complete cleft palate	2 flap palatoplasty with levator dissection and retroposition
7	Bilateral complete cleft palate	2 flap palatoplasty with levator dissection and retroposition
8	Secondary cleft palate (short)	Pharyngeal flap with levator dissection and retroposition
9	Secondary cleft palate (fistula)	Closure of the fistula with re-repair of the palate

Morocco, and some of the African countries such as Nigeria or Algeria with approximately 18% of the world’s population,⁶ which lack the expertise as well the resources to help the patients with cleft. A sincere effort should be made (especially by teams from group A and B countries) to train the human resource in all the disciplines of cleft care, in these countries. It is possible for reasonably good teams

to be developed within 5–7 years which can become effective and more productive in helping more and more patients with cleft.

In group D are the poor countries of Africa, Asia, and Latin America which truly need international cleft missions to support and manage cleft care. The above-mentioned scheme of cleft care is supported by the fact that Operation Smile has organized 152



Fig. 1. A, A 2-year-old boy with unilateral complete cleft lip on left side. B, Postoperative picture at 3-month follow-up.



Fig. 2. A, A 6-year-old girl with unilateral incomplete cleft lip on left side. B, Postoperative picture at 3-month follow-up.

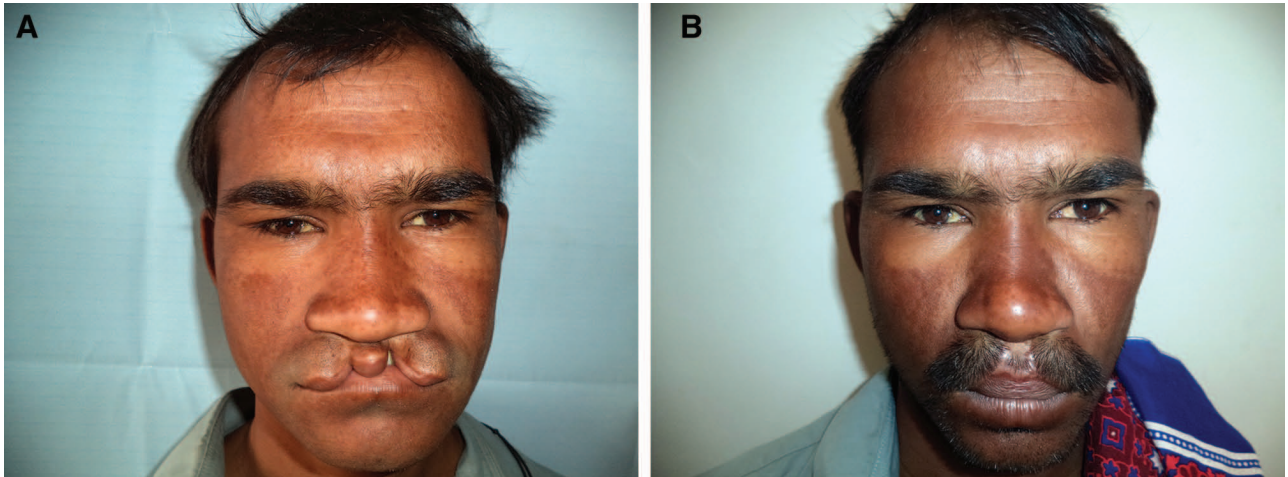


Fig. 3. A, A 28-year-old man with bilateral incomplete cleft lip. B, Postoperative result after 3-month follow-up.

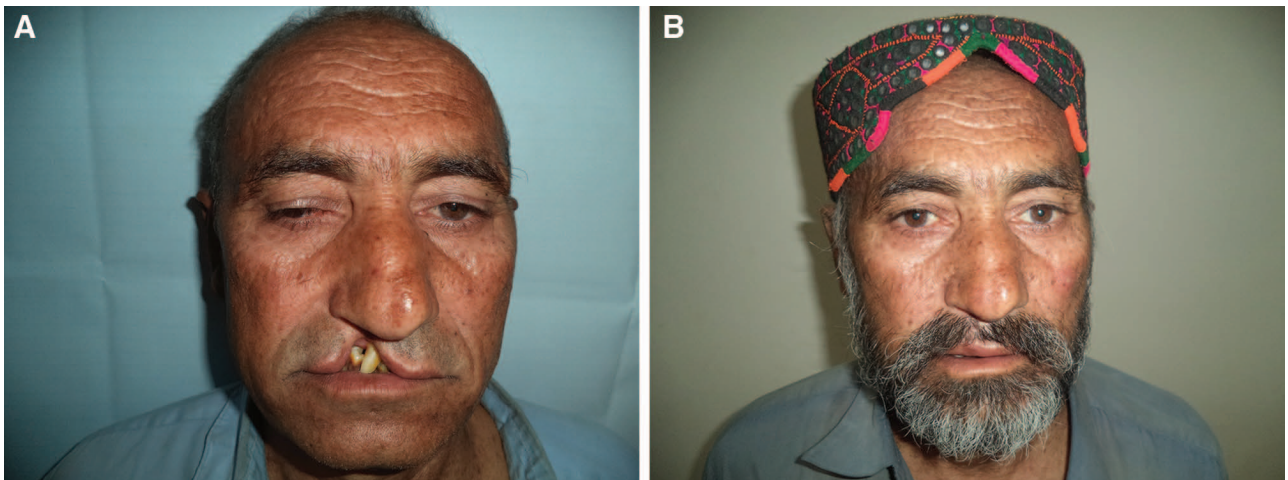


Fig. 4. A, A 54-year-old man with unilateral incomplete cleft lip on right side. B, Postoperative result after 3-month follow-up.

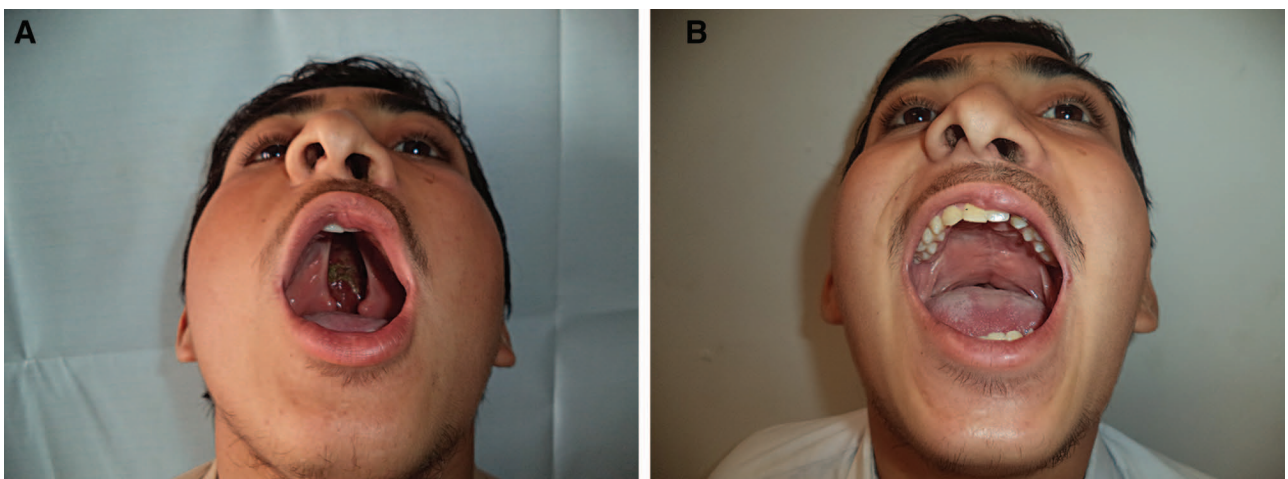


Fig. 5. A, An 18-year-old man with unilateral complete cleft palate on left side. B, Postoperative result after 3-month follow-up.

cleft missions in group B countries, 276 cleft missions in group C, and more than 239 cleft missions in group D countries since 2010.¹¹

A team developed from within a country of group B can also visit the neighboring country of group C or D, to effectively reduce the burden of cleft care (like

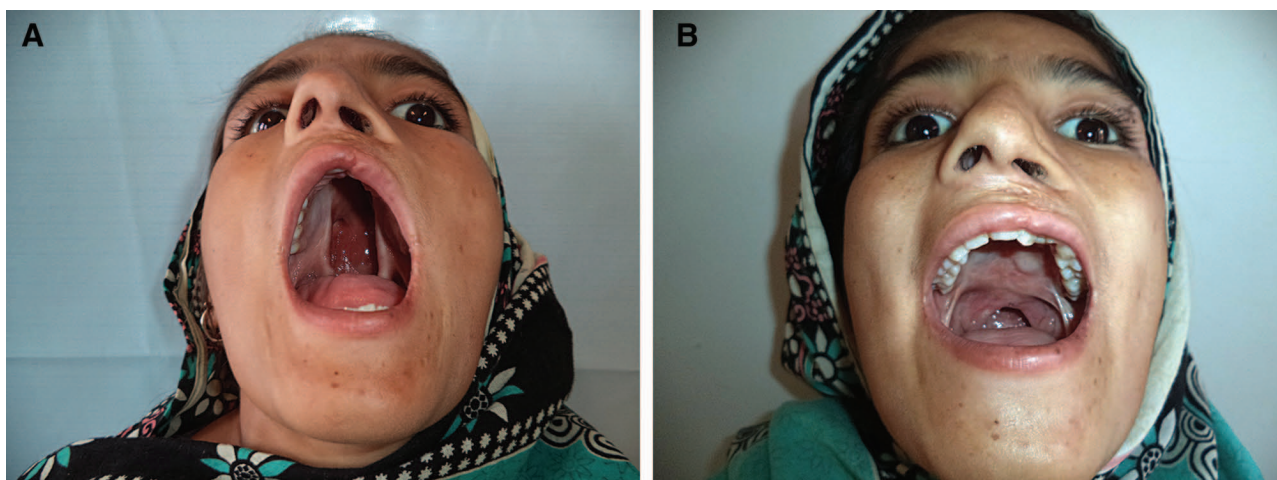


Fig. 6. A, A 16-year-old girl with unilateral complete cleft palate on left side. B, Postoperative result after 3-month follow-up.



Fig. 7. A, A 22-year-old man with bilateral complete cleft palate. B, Postoperative result after 3-month follow-up.

4 cleft missions by Cleft Lip and Palate Association of Pakistan at Kabul, Afghanistan, to operate a total of 640 patients in the year 2013 and 2014). If our model is applied to group B countries, the resources of organizations like Operation Smile can then be focused on more cleft missions in group C and D countries. With the passage of time, international cleft missions will be needed only in group D countries.

The senior surgeon has developed a team for cleft missions as mentioned in Table 2. As the team

has been routinely carrying out cleft missions over the last 10 years, many of the early problems have been resolved. There are many organizations that engage cleft surgeons from different parts of the world to work in remote areas of Africa, Asia, and South America.¹² As different team members are selected in different cleft missions, these organizations have developed strict protocols which some of the participants might not feel comfortable complying with. Similarly, a language barrier can exist between the team members who arrive from different parts of the world. Duration of individual surgical procedures may also increase considerably if the surgical assistant has difficulty in understanding surgeon's instructions.¹³ However, the model presented in this article caters for any possible lack of coordination as each member of the team knows his job well and is well versed with the task at hand. Because of this team approach, a lot of time is saved and near misses are avoided.

Table 6. Complications in Patients Operated for Cleft Palate

Sites of Palatal Fistulae/Dehiscence	No. Patients
Junction of hard and soft palate	7
Posterior third of hard palate	2
Middle of the hard palate	3
Dehiscence of uvula only	1
Dehiscence of hard palate only	1
Complete dehiscence of whole palate	2
Total	16

Table 7. Cleft Care Resources in Different Parts of the World

Groups	A	B	C	D
Cleft patient program availability	Well-developed healthcare programs	Surgical expertise available; Cleft systems not focused	Lack expertise and surgical resources	Lack expertise, surgical resources, and infrastructure
Examples	Schengen countries of Europe, Japan, Australia, USA, Canada, UK, New Zealand, Taiwan, Hong Kong, Singapore, South Korea and rich countries of Middle East	China, India, Indonesia, Pakistan, Iran, Malaysia, Brazil & Thailand	Argentina, Nigeria, Mexico, Bangladesh, Vietnam, and Iraq	African, Asian, and Latin American Poor Countries
% of world population	13%	52.22%	18%	15.78%

There are many surgical procedures that are not carried out routinely in many international cleft missions, for example, adult cleft palate repair.¹⁴ Our team has the protocol of operating upon all patients who are fit for surgery no matter what their age is. The average age of the patients in this mission was 7 years, and there were 82 patients of cleft palate whose age was 5 years or above. We believe that there is always significant improvement of speech in adults in addition to creation of an interface between oral and nasal cavities. Similarly, cleft rhinoplasty was routinely performed on all patients with cleft lip during this mission. Primary cleft rhinoplasty is not performed in many of the international cleft missions, either because of time constraints or lack of skill.¹⁵ Many organizations operate only on primary patients during the missions and avoid operating upon patients with secondary cleft because of increased risk of complications.¹⁶ Our team takes special care of patients with secondary cleft to reduce the risk of complications in these challenging cases. In the described cleft mission, we operated on 13 patients with secondary cleft lip and 22 previously operated patients with cleft palate. However, in many of our missions, the number of secondary patients was more than 25%.

One of the biggest problems identified as a limitation of a cleft mission is the follow-up of the patients operated on, due to financial and human constraints.¹⁷ Our team has a strong follow-up schedule. In the presented cleft mission, a follow-up of the patients has been done already at 1 week, 1 month, and 3 months from the time of surgery.

There are many cleft missions in the world where resident or trainee surgeons are encouraged to operate.¹⁸ This has resulted in the increased rate of complications of up to 50% palatal fistula formation among the palate patients.¹⁶ We train our surgeons at our cleft center in Lahore, and only fully trained surgeons are allowed to operate at cleft missions. The overall fistula rate in the presented cleft mission is 9.75%, which is comparable to international

standards and is certainly much better than any of the cleft mission statistics.

After completion of surgical procedure, shifting the patient immediately to the recovery room saved 30–40 minutes. This has resulted in a marked increase in the number of surgical procedures carried out in limited time as depicted in Table 4. We used 2 operating tables in our first mission in the year 2004, and over the period of time, we have developed our team to run 6 operating tables simultaneously. We would suggest any cleft team to progress in the same way.

In some cleft missions, there are certain limitations such as use of tongue flap for large-sized palatal fistula or Abbe flap for philtral reconstruction. There was no such patient in this mission. Nevertheless, in such a situation, our policy is to select only those patients who are willing to come to Lahore for division and inseting 3 weeks after the surgery.

CONCLUSIONS

There is certainly a genuine need to organize the cleft missions in such a way that international missions be directed toward the poor and deserving countries only. Countries where surgical expertise is available, or can be developed, should be encouraged to organize national cleft mission teams, which can become cost-effective, robust, and more productive with better results. Around 52% of the world's population can be benefited by model cleft missions like the one presented by our team.

PATIENT CONSENT

Patients or their parents or guardians provided written consent for the use of the patients' image.

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