

Anaesthesia for cleft lip surgery – a challenge in rural Nepal

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Abstract

Cleft lip and palate is quite common in Nepalese population residing in hilly areas and interior of the country. Nepalese doctors with limited resources and fund and International aided team of fully equipped doctors from developed world conduct operative procedures in the centre or district hospital setup quite frequently. But very few patients will come to the hospital for treatment as it is not an emergency for them. Anaesthesia for cleft lip and palate surgery carries a high risk and difficulty in airway management. Associated congenital anomalies further complicate the management. Still a team of Nepalese physicians are providing this service in a field. How to provide safe anaesthesia was a main concern for an anaesthesiologist with a limited supply. During the last three years we have anaesthetized safely four hundred children aged between 2 months to 14 years. The team worked at an altitude ranging from 100 feet to 10,000 feet of Nepal in a temporary erected operation room of the village. Most of the operations were conducted under total Ketamine anaesthesia and general anaesthesia with halothane. In our context we found Ketamine anaesthesia was safe and effective anaesthetic technique in simple clefts in children more than 2 years. This technique reduces the cost by minimizing the supply to be carried in the field.

Key words: cleft lip, cleft palate, ketamine, rural area, difficult intubation.

Introduction

Cleft lip and palate are the most common craniofacial anomalies seen in developing countries. The approximate incidence is 1 in 700 live births, among them 25% are bilateral and 85% are associated with cleft palate. Isolated cleft palate occurs in 1 in 2000 live births and chances of other associated congenital anomalies are more in this group of patients, compared with cleft lip with and without cleft palate patients. Complex classification has been devised but essentially the cleft can involve the lip, alveolus (gum), hard palate and/or soft palate and can be complete or incomplete, unilateral or bilateral^{1,2}.

Nowadays, there is a move towards earlier repair of cleft lip and palate but in our part, because of unawareness, poor socioeconomic status and difficult approach to health delivery system; the repair has to be done even in older ages especially cleft lip repair! Without repair, these children suffer from facial disfigurement and potential social isolation, feeding problems and abnormal speech. Early repair is necessary for cosmetic reasons and also facilitates feeding and speech development.

As there is a chance of associated congenital anomalies along with cleft lip and palate, careful clinical cardiac, respiratory and neuromuscular evaluation of children is necessary before anaesthesia and surgery. More than 100 syndromes have been described but fortunately all are very rare. Some syndromes which may have anaesthetic implications are Pierre Robin, Treacher Collins and Goldenhar syndromes².

Anaesthesia during cleft lip and palate surgery carries a high risk and difficult airway management in children. Because of other associated congenital anomalies, the anaesthetic management becomes more complicated. Most of the anaesthetic morbidity related to these procedures relates to the airway management, either difficult intubations or postoperative airway obstruction, as assessment of degree of difficulty of intubations before surgery is not always possible in small children⁵. We studied the safety of different anaesthetic procedure in rural areas of Nepal where there was lack of or inadequate anaesthetic setup during cleft lip surgery in children.

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Materials and methods

400 children of 2 months to 13 years of age and ASA I and II, in different district hospitals and health centres of rural Nepal, Terai to Himalaya region (altitude ranging from 100 feet to 10,000 feet), were in study. This study was conducted from April 1998 to April 2002. In many places the team had to walk for days with all the supply.

Preoperative evaluation was done carefully with main priority on upper airway anomalies, chest infection and other associated congenital anomalies in cardiovascular system and neuromuscular system. Fasting interval was 6 hours for solid food, 4 hours for breast milk and 2 hours for clear fluid. Peripheral pulse, oxygen saturation and precordial stethoscopes were used to monitor the children.

Photographs 1 & 2. Monitors and instruments used in the field.



Most of the children were premedicated with 10 mg/kg of oral ketamine along with 5.0 ml of fruit juice, 15-30 minute before induction of anaesthesia, older children were IV cannulated and proceeded. All children were premedicated with 20 µg/kg of atropine for antisialagogue effect after intravenous cannulation.

with general anaesthesia. Induction was done with 1mg/kg of ketamine along with 1mg/kg of suxamethonium to facilitate endotracheal intubation. Gas induction was done in few infants. Anaesthesia was maintained with halothane, ketamine and assisted ventilation. After completion of surgery, trachea was extubated in deep plane of anaesthesia with adequate respiratory effort and sucking out the upper airway. All children were nursed in lateral position with careful monitoring in postoperative period. Any difficult intubation, laryngospasm and intraoperative aspiration were noted and analyzed.

One group (250) of children (unilateral incomplete cleft lip and more than 5 years) were managed with total intravenous anaesthesia with IV boluses of ketamine and midazolam (TIVA), intermittent oropharyngeal suction and other measures to decrease secretion and trickling down of blood from operation site. Secretion was minimized by atropine premedication and bleeding by adequate haemostasis. All medicines and equipments were always ready for intubation and ventilation if any airway compromise occur during surgery.

Results

Age group was 2 months to 13 years with 251(62.8%) male and 149 (37.3%) female children. Family history (in grandparents, parents, uncles, elder or younger) of cleft lip and/or palate was present in 41 out of 400 children (10.2%). Among the 400 cases, 234 (58.8%) were left sided clefts, 124(31.0%) right sided, 41 were bilateral and one was cleft seven. Incomplete cleft lips were more common (incomplete left 36.2%, complete left 22.3% and incomplete right 17.2% and complete right 13.8%). 201 (50.2%) cleft lips were associated with cleft palate as well (table 2).

Another group (150 cases, less than 5 years, complete cleft lip and palate and bilateral clefts) was managed

Photographs 3 & 4. Suction machine, o₂ concentrators and medications used in the field.



Table 1 Age and weight of children:

Age group	No. of children	Weight(kg)	No. of children
Infants	40	4-10	123
1-6 years	229	11-20	184
6-13 years	131	21-30	93
Total	400	total	400

There were 40 infants, 229 children of 1-6 years and 131 children of 6-13 years age group. Most of the children were malnourished as weight for age was lesser than expected but we didn't test it statistically.

Photographs no. 5 & 6. Operating room with team and few operated children in Humla, highest place of study during our mobile surgery in different parts of rural Nepal.



Fig 1 & 2 Line and bar diagram showing age distribution of children and bar diagram showing sex ratio in children (251 males and 149 females).

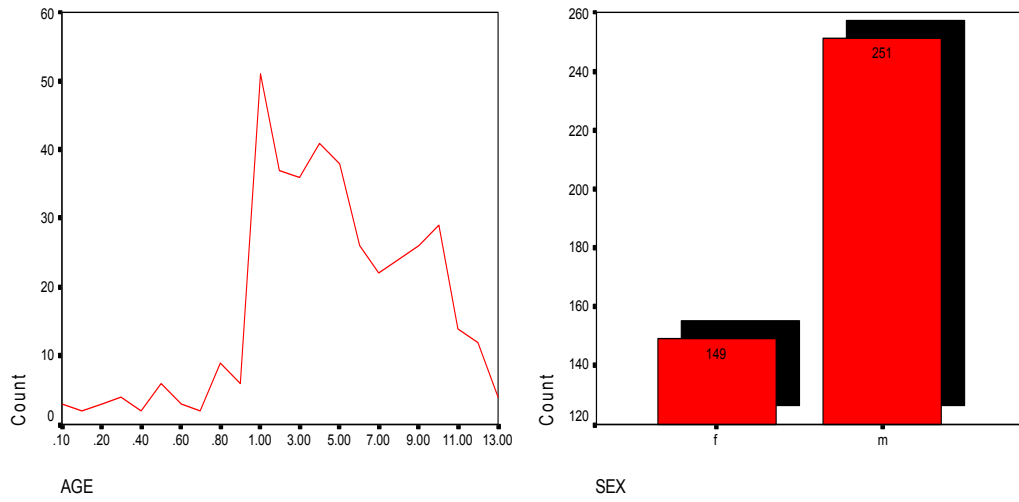
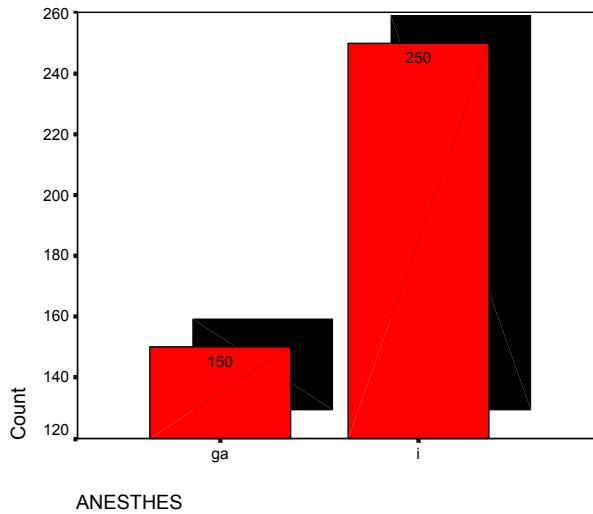


Table 2 Types of cleft lips

Site of cleft	Complete	Incomplete
Left sided (234, 58.6%)	89 (22.3%)	145 (36.2%)
Right sided (124, 31.0%)	55 (13.8%)	69(17.2%)
Bilateral	41 (10.2%)	
Cleft seven	1 (0.3%)	
Associated cleft palate	201 (50.2%)	

Fig 3 Bar diagram showing types of anaesthesia delivered (ga, i=iva)



Photographs 7 & 8. Preoperative and postoperative case of bilateral complete cleft lip with cleft palate.



All children should be regarded as difficult intubation cases because of some anatomical differences compared to adults. During this study, 2nd attempt laryngoscopy was needed in 5 children out of 150, all of them are unilateral or bilateral cleft lips associated with cleft palate. Difficult intubation (more than 3 attempts of laryngoscopy with different blades) was there in 3 children with bilateral cleft lip with palate (2%).

Intraoperative laryngospasm occurred in 4 children in TIVA group, 2 of them required endotracheal intubation and positive pressure ventilation. Post extubation laryngospasm occurred in 8 children but all were managed with mask ventilation with 100% oxygen. Intraoperative aspiration occurred in 20 children out of 400 but there was no aspiration pneumonitis.

Photographs 9 & 10. Incomplete bilateral cleft lip, before and after repair.



Photographs 11 & 12. Incomplete unilateral cleft lip, before and after surgery.



Discussion

This was a prospective observational study in different rural areas of Nepal during mobile service to the people who were unable to reach the centre for the operative service provided there.

We first carefully evaluated the children, then premedicated with oral ketamine and then proceeded in two ways. One group, younger children with bilateral clefts or cleft lip associated with palate were managed with general anaesthesia with endotracheal intubation; and next group, older children and unilateral clefts without cleft palate were managed with intravenous ketamine, midazolam and atropine. All of them were carefully monitored and drugs and instruments for airway management were kept ready in hand.

Oral ketamine premedication is very effective in calm separation of children from parents, IV cannulation, smooth induction, maintenance and recovery from anaesthesia though we did not study these events statistically. It is better when combined with

intravenous or intramuscular atropine to decrease oropharyngeal secretions.

Although it is recommended general anaesthesia with endotracheal intubation for perioral surgery, we can apply alternative anaesthetic techniques in less affluent hospitals i.e. intravenous ketamine with continuous infusion or intermittent injection without intubation for cleft lip repair in children over 12 months with monitoring of oxygen saturation and keeping in hand all equipment for intubation and ventilation^{4,6}.

During the study, there were few cases where 2nd attempt laryngoscopy was needed (5 out of 150 cases) and difficult intubation in 3 cases (2%). Cormack and Lehane grading were not studied because of some technical problems. Intraoperative laryngospasm occurred in few cases who were managed with intravenous ketamine only, as ketamine doesn't decrease upper airway reflexes and chances of trickling down secretions and blood from operation site, but they were managed carefully.

Photographs no.13&14. Children undergoing surgery under IVA and GA with endotracheal intubation.



We did infraorbital nerve block in some cases, which is very good and reliable technique to decrease general anaesthetic and analgesic requirements and also for post operative analgesia. The surgeons inject 1% lignocaine with 1:200,000 adrenaline in the operative area which also helps to decrease bleeding and less analgesic requirement intraoperatively^{2,7}.

Gunwardana reports the findings of 10 years prospective study of 800 patients presenting for cleft lip or palate surgery- laryngoscopic grading and degree of difficult intubation. 59 cases bilateral, 52 retrognathia, Cormack and Lehane grading III or IV was associated with difficult intubation in 86% of

cases and in lower grading 2% only. Difficult intubation was lesser in more than 5 years group. Failure to intubate occurred in 1% of patients, all were less than 6 months of age^{2,3}.

Embryologically clefts arise from failure of fusion or breakdown of fusion between the nasal and maxillary processes and the palatine shelves that form these structures at around 8 weeks of intrauterine life. In our series, 88% of clefts were unilateral (57% left and 31% right), 10% bilateral and 50% of cleft lips were associated with cleft palate^{1,2}.

In addition to the standard preoperative evaluation, special care needs to be taken in following aspects as

well. The combination of cleft palate, micrognathia and upper airway obstruction constitutes Pierre-Robin syndrome, which invariably causes great problem on airway management. 5-10% patients suffer from congenital heart disease. There may be chronic rhinorhea, chronic airway obstruction and sleep apnoea due to reflux into the nose and obstruction during sleep. Right ventricular hypertrophy and cor pulmonale may result from recurrent hypoxia and airway obstruction¹.

Conclusion

Oral ketamine was very good premedication agent in calm separation of children from parents and even for IV cannulation. Oral ketamine premedication and intramuscular or intravenous boluses of ketamine with atropine can be used without intubation for simple cleft lip surgery in children over one year of age, with oxygen saturation monitoring and all equipment for intubation and ventilation should be ready in hand.

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