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Anaesthesia For Cleft Lip And Palate Surgery: University of Ilorin Teaching Hospital Experience.

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Abstract

Background: Providing anaesthesia for cleft lip and palate surgery presents a considerable challenge to anaesthetists. However, as long as surgery remains the only definitive treatment known to man anaesthetists must be prepared to face the challenge. This is a retrospective study at the university of Ilorin Teaching Hospital, Ilorin.

Objective: To present our anaesthetic experience for the repair of cleft lip and palate over a period of 11 years, with a view to highlighting the problems and challenges.

Methodology: The record of all patients who underwent surgical operation for the repair of cleft lip and palate between January 1996 and December 2006 were retrospectively reviewed. Information was obtained from patients case notes, theatre and anaesthetic registers and anaesthetic charts. Information extracted included patient's demographic characteristics, types of cleft anomaly, preoperative status, anaesthetic management, grade of anaesthetist, specialty of the surgeon, perioperative course and final outcome.

Results: A total of 58 patients were anaesthetised for surgical repair of cleft lip or palate within the study period. However, only 44 case notes could be retrieved for analysis giving a case note retrieval rate of 76%. A total of 51 operations were done on these patients because seven of the patients had repeat repair after the breakdown of the initial repair. There were 20 males and 24 females, giving a male: female ratio of 1:1.2. The ages ranged between 14 days and 22 years, but majority of the patients (76.5%) were in their first six months of life. All the patients were in the American Society of Anaesthesiologist (ASA) type I. Only one patient had associated congenital anomaly of anaesthetic importance. All the patients had general anaesthesia

with endotracheal intubation and relaxant technique. Anaesthesia was uneventful in all of them. There was no mortality in our series.

Conclusion: Anaesthetic management for cleft lip and palate surgery can be very safe and highly rewarding even in developing countries with limited resources.

Key Words: Cleft lip and palate, surgery, anaesthesia.

Introduction

Cleft lip and palate are the most common craniofacial abnormalities^{1,2}. Surgery remains the only definitive treatment known to man. To facilitate this, a multidisciplinary cleft team has been advocated in which the anaesthetist is an important member³. The history of involvement of anaesthesia and Anaesthetist in the care of patients with lip surgery dates back to 1847, when John Snow successfully administered ether anaesthesia for lip repair^{4,5}. The procedure was then besieged with problems such as difficulty in maintaining an unobstructed air way, prevention of aspiration, encroachment on the surgical field and bulky anaesthetic equipment. Fortunately, developments in anaesthetic technique and equipment, particularly, the advent of endotracheal anaesthesia, provision of less bulky anaesthetic breathing system, and recent advances in perioperative monitoring, have greatly improved anaesthetic management in these patients. However, although the procedure is now much safer for the patient and less cumbersome for the surgeon, providing anaesthesia for the repair of cleft lip and palate remains a great challenge for the anaesthetist. This is particularly so in developing countries due to inadequate resources and limited facilities for preoperative screening for associated congenital anomalies, some of which may have considerable implications for anaesthesia. This retrospective study presents our anaesthetic experience for the

repair of cleft lip and palate over 11 years.

Methodology

The University of Ilorin Teaching Hospital where this study was carried out is geographically located in the middle-belt region of Nigeria, and it serves an estimated population of about 4 million people. It functions both as a general as well as a specialist hospital. The records of all patients who underwent surgical operation for the repair of cleft lip and palate between January 1996 and December 2006 were retrospectively reviewed. Information was obtained from patients' case notes, theatre and anaesthetic registers and anaesthetic charts. Information extracted include patient's demographic characteristics, types of cleft anomaly, preoperative status, anaesthetic management, grade of anaesthetist, specialty of the surgeon, perioperative course and final outcome. These were manually entered into proforma and subsequently analysed using SPSS version 15.0 software.

Results

Patient characteristics: A total of 58 patients were anaesthetised for surgical repair of cleft lip or cleft palate within the study period. However only 44 case notes could be retrieved for analysis, giving a case note retrieval rate of 76%. In all, 51 operations were done for 44 patients, as 7 patients had their repairs repeated following the breakdown of the first repairs. There were 20 males and 24 females, giving a male: female ratio of 1:1.2. The age distribution of the patients at presentation is shown in table 1.

Table 1: Age at presentation in 51 cases of cleft lip and palate repaired at U.I.T.H, Ilorin, Nigeria

Age	Frequency	Percent
<3 months	36	70.6
3-6 months	2	3.9
7-9 months	3	5.9
>12 months	5	9.8
Not recorded	5	9.8
Total	51	100.0

The ages ranged between 14 days and 22 years. Majority 36 (70.6%) of the patients presented before the age of 3 months, but most of the patients (76.5%) had their repair operations done between the ages of 14 days and 6 months (table 2).

Preoperative assessment:

Table 2: Age at Operation in 51 cases of cleft lip and palate repaired at U.I.T.H, Ilorin, Nigeria

Age	Frequency	Percent
1-3 months	24	47.1
4-6 months	15	29.4
10-12 months	1	2.0
>12 months	11	21.6
Total	51	100.0

All the patients were of the American Society of Anaesthesiologist (ASA) physical status classification 1. The types of cleft anomalies are shown in table 3.

Table 3: Types of cleft anomalies in 51 cases of orofacial cleft repaired at U.I.T.H, Ilorin, Nigeria.

Type of cleft	Frequency	Percent
Right Cleft lip	8	15.7
Left Cleft lip	9	17.6
Right Cleft lip and Palate	12	23.5
Left Cleft lip and Palate	14	27.5
Bilateral Cleft lip and Palate	4	7.8
Bilateral Cleft lip	1	2.0
Midline Cleft Palate	2	3.9
Palatine Fistula	1	2.0
Total	51	100.0

Apart from one patient who had associated retrognathia, none of the other patients had any associated congenital anomaly of anaesthetic importance. The commonest associated preoperative medical conditions were anaemia, (PCV less than 30%), and upper respiratory tract infection (URTI), which occurred in 17 (33.3%) and 16 (31.4%) cases respectively, followed by bronchopneumonia in 3 (5.9) cases.

Laboratory investigations:

Preoperative laboratory results were not available at all in 3 cases (5.9%), while it was incomplete in 22 (43.1%) cases. Apart from those with positive culture results from nasal or throat swabs, the only significant laboratory abnormality is low pack cell volume, i.e less than 30%.

Preoperative preparation/optimization: Preoperative preparation include parental counselling and feeding advice, done at the surgical outpatient department. Those with intercurrent

infections had the infections well controlled with antibiotics before surgery. All the patients were admitted at least 3 days before surgery to allow preoperative laboratory investigations to be done. Some patients had to stay longer than three days before surgery, either because parents declined outpatient preoperative preparation and optimization for social reasons or just preferred to remain in the hospital because of long distance from home.

Technique of anaesthesia:

All the patients had general anaesthesia with endotracheal intubation and relaxant technique. Induction of anaesthesia was achieved by inhalational method with halothane in 46 (90.2%) cases and sodium thiopental in 5 (9.8%) cases. Intubation was facilitated by suxamethonium in 47 (92.2%) cases, while in the remaining 4 (7.8%) cases intubation was accomplished under deep halothane anaesthesia. Thirty (50.8%) of the endotracheal intubations were done by consultant anaesthetists while the remaining were done by senior residents with consultants in attendance to supervise. In those with cleft palate, the cleft was usually occluded with a small piece of gauze to aid proper laryngoscopy by preventing the laryngoscope blade from slipping into the cleft. The tracheal tube was anchored centrally over the lower lip (fig. 1).



Figure 1. Photograph of a child under anaesthesia for Cleft lip surgery showing endotracheal tube secured at the centre of the lower lip

The hypopharynx was packed with wet gauze to prevent blood and secretions trickling down the larynx and the eyes were protected with adhesive plaster to prevent corneal damage. Anaesthesia was maintained with halothane in oxygen with or without nitrous oxide, delivered via a Jackson-Rees modified Ayre's T-piece breathing circuit. Pancuronium was employed to maintain muscle paralysis and ventilation was by manual intermittent

positive pressure ventilation (IPPV). Analgesia, provided by intermittent bolus doses of narcotics (pethidine or pentazocine) as required, was often supplemented with intermittent bolus doses of ketamine, especially when nitrous oxide was not available. Intraoperative monitoring included heart rate, by precordial stethoscope, and pulse oximetry when available. Anaesthesia was uneventful in all the patients. None of the patients required blood transfusion as blood loss was minimal. There was no mortality in our series.

Blood Loss:

Records of blood loss were incomplete and in only a few cases were losses recorded in the case notes. Blood loss was estimated by visual estimation of the losses to the gauze swab and the drape. Losses ranged from 5ml-150ml, with the larger volumes of blood loss being in cleft palate repair.

The operations:

There were 48 (94.1%) cases of lip repairs and 3 (5.9%) cases of palate repairs. Thirty nine (76.5%) of the operations were done in the first six months of life and only 11 (2.6%) in patients aged over 1 year

Postoperative analgesia:

All the patients received a combination of intermittent intramuscular bolus doses of pethidine or pentazocine and oral paracetamol 15-20mg/kg for post operative pain control.

Discussion

Fifty one cases in 11 years is small for a disease whose incidence is quoted to be in the range of 1 in 800 live births¹. The reason may be partly connected with the usual problems associated with retrospective studies, such as inadequate records and incomplete information. More over, the awareness of the possibility of corrective operations for these abnormalities is still very low in our environment and many cases may remain in the rural communities unrepaired. This series had very few cases of palate repairs because in the early period covered in the series, most of the repairs were done by the general surgeons and otorhinolaryngologists who were only interested in the lip repairs and referred associated palate defects to other centres. Even when facilities and manpower became available for palate repairs many patients who had combined cleft lip and palate never bothered to come back for palate surgery once the cleft lip was successfully repaired.

Majority of our patients (70.6%) presented before the age of 3 months. This pattern of early

presentation is similar to the observation of Ademiluyi et al in LUTH⁶, but is at variance with the finding of Olasoji et al in North Eastern Nigeria⁷.

Virtually all known inhalational anaesthetic agents have been used for anaesthesia in the repair of cleft lip and palate. However, for the developing countries, halothane remains the cheapest and most readily available inhalational agent for paediatric anaesthesia. The main advantages of halothane in this age group are smooth induction and early suppression of pharyngeal reflexes, which allows early intubation without muscle relaxant when so desired. Sevoflurane is a useful alternative but it is more expensive and not readily available in most developing countries². Halothane was used for all the patients in our series because it was the only inhalational agent available in our hospital for most part of the period reviewed. One main problem with halothane in cleft surgery is its arrhythmogenic tendencies, especially if the heart has been sensitized by the use of epinephrine infiltration, as done in some of our patients. This interaction between epinephrine and halothane has, however, been appraised in children undergoing cleft palate repair and it was concluded that the reaction is insignificant when epinephrine is used at a mean dose of 7.8mcg/kg, and given together with lignocaine⁸. We have always restricted the dose of epinephrine to 5mcg/kg to prevent arrhythmias in our patients. Although we do not routinely monitor our patients electrocardiographically during surgery due to lack of facilities, this dose of epinephrine when used during halothane anaesthesia is known to be very safe⁹. Other measures suggested to minimize the interaction are hyperventilation and adequate oxygenation¹⁰, both of which are usually guaranteed by our usual technique of controlled ventilation.

Although spontaneous ventilation technique can and has been successfully employed for cleft lip and palate repair, it may not be suitable in very young infants. Controlled ventilation with muscle paralysis was employed in all our patients in line with our practice for paediatric anaesthesia. This technique allows for a lighter plane of anaesthesia and more rapid awakening with recovery of reflexes at the end of surgery, which is highly desirable in these patients. It also has the distinct advantage of ensuring adequate oxygenation and elimination of carbondioxide.

Most of our patients particularly, the very young, were induced by inhalational method. Inhalational induction is convenient and well tolerated in

children and is useful in preventive potential airway management problems. Although malformations of the lip and buccal cavity often increase the incidence of airway obstruction during induction in patients, application of increased airway pressure with a well fitting facemask is known to minimize these risks¹. There were no documented anaesthetic induction problems in any of our patients.

A good control of the airway is of supreme importance in the surgical repair of cleft lip and palate, as majority of the associated anaesthetic morbidities from these procedures relate to problems associated with airway management². Tracheal intubation is imperative to ensure a reliable, safe and uncontaminated airway. However, successful endotracheal intubation presents a considerable challenge in cleft patients. The problems of difficult laryngoscopy in patients with cleft lip and palate had been recognized by Magill more than 80yrs ago, and since then various techniques have been described to solve them¹. Unfortunately, the assessment of the degree of difficulty which may be encountered during intubation before operation is not always possible in the patients, as the existing bedside tests for predicting difficult intubation in adults require patient co-operation and are therefore not practical in children. We have always relied on the recommended simple measures such as the use of stillete to appropriately mould the shape of the tracheal tube, and the recommended external laryngeal pressure¹², as aids to tracheal intubation in our patients. Over 150 syndromes such as Pierre Robin, Treacher Collins and Goldenliar have been described in association with cleft lip and palate¹. Fortunately all of these syndromes are rare and apart from one patient with retrognathia, none was documented in association with the cleft abnormalities in any of the patients in our series. However, the possibilities of associated congenital anomalies should always be born in mind. A careful history and physical examination should always be carried out to exclude them during preoperative assessment.

The presence of multiple clefts, and age less than 6 months, are associated with an increased incidence of difficult laryngoscopy in patients with orofacial clefts¹¹. When these conditions are present it may be wise to avoid the use of neuromuscular blockade for intubation until ability to manually ventilate the lungs with facemask is confirmed. The use of a straight blade laryngoscope is favoured in cleft

patients and administration of neuromuscular blocker (suxamethonium), when there are no contraindications, is believed to enhance the success of endotracheal intubation. Although majority of the patients (74.5%) in our series were either below or just about the age of 6 months, all the patients were successfully intubated. This is not surprising as difficult laryngoscopy is not synonymous with difficult intubation and cases with potential difficulty in intubation like cleft patients are best handled by experienced anaesthetists. Sophisticated methods, which may not be applicable in the very young age group but have been used to aid intubation in cleft lip and palate patients, include those involving fiberoptic techniques, retrograde techniques, the use of bougies, specially designed light wands and laryngoscopes and blind nasal intubation^{1, 13}. These are methods which require special equipment, training and experience, and are either, expensive or not readily available.

A variety of tubes, usually uncuffed, have been used successfully for tracheal intubation in cleft lip and palate repair. Whichever tube is used, the most important thing is that the tube should not become kinked behind the pharynx or be compressed by the mouth gag in cleft palate repair. The preformed oxford portex tube was used in all our patients, being the only type available. Its inbuilt pharyngeal curve is particularly valuable in our situation and a malleable stillete is often used to give it a more anterior curve when necessary. The oral preformed south pole RAE tube is another commonly employed tube, but the use of amoured tube, with its property of being non-kinkable, is probably the best especially in cleft palate repair.

Anaemia was the most common medical problem in our patients. This is not surprising as most of them were within the age of six months, a recognised age for physiological decline in haemoglobin concentration after birth due to the change from fetal to adult haemoglobin². However, as seen in our series, the magnitude of the anaemia is not usually such that would require preoperative transfusion. Our experience for cleft lip repair is that blood loss is minimal, and preoperative haemoglobin concentration above 9gm/dl is safe for anaesthesia. Crossmatching of at least one unit of blood is advisable for palate repairs, although blood transfusion is rarely required. Nutritional problems due to difficulty with feeding, as observed in some of our patients, may also contribute to the development of anaemia in developing countries². This will

respond to a few weeks course of haematinics.

Respiratory tract infections are not uncommon in patients with cleft lip and palate as recorded in some of our patients. Chronic rhinorrhoea is particularly common due to reflux of food into the nose during feeding^{2,7}. Many of such cases are benign and non-infectious. Thus some of our patients had negative throat and nasal swabs.

However, tracheal intubation during anaesthesia can disseminate^{14,15} actual significant respiratory infection and increase perioperative complications. Our practice of routine preoperative antibiotic treatment reduces such complications.

Effective perioperative analgesia is desirable in both palate and lip repairs. Failure to do so may lead to a restless and agitated child prone to handling the surgical site and thereby increasing the risk of postoperative surgical complications^{2,16}. The repair operation in cleft lip is less traumatic than in palate repair. Bilateral infra-orbital nerve block is a simple, safe and effective means of providing pain relief following repair of cleft lip^{16,17}. It provides excellent intraoperative and early postoperative analgesia without the risk of respiratory depression, which may occur when opioid analgesics are used¹⁸. This is not being practised in our centre yet because of lack of expertise. Cleft palate patients may require the use of carefully titrated intraoperative opioids to achieve good analgesia². This will also result in smooth emergence and less crying on extubation, which reduces the risk of trauma to the airway and decreases postoperative bleeding, as well as providing a good early postoperative analgesia. We have always relied on the use of opioid analgesics as our main source of perioperative analgesia for both cleft lip and palate repair in our centre. In some cases, subanaesthetic doses of ketamine are used to supplement intraoperative analgesia, especially when nitrous oxide is not available. Oral acetaminophen is added in the postoperative period to enhance analgesia in our usual multiple drug combination technique of pain control. However, administration of the acetaminophen, either orally as premedication or rectally after induction, has been recommended to ensure adequate blood levels of the drug at the end of surgery. Local anaesthetic infiltration, as often done by some surgeon and as documented in a few of our patients, also provides useful intraoperative analgesia, which in some cases may also extend into the immediate postoperative period.

Maintenance of uncontaminated and unobstructed

airway at the end of anaesthesia is also of critical importance in the patients. Acute airway obstruction and/or aspiration are real dangers at the end of the procedure. We always ensure that tracheal extubation is carried out only when the patients are fully awake and are able to control airway reflexes, and the surgical field is dry.

Conclusion

Providing anaesthesia for the repair of cleft lip and palate remains a great challenge for the anaesthetist. Fortunately, however, the developments in anaesthetic technique and equipment, coupled with the recent advances in perioperative monitoring, has rendered anaesthesia for the procedures much safer for the patient, less cumbersome for the surgeon, and rewarding for the anaesthetist, even in developing countries with limited resources. Careful preoperative preparation and patient optimization is necessary to enhance the safety of anaesthesia.

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