COMPLETE CLEFT PALATE CLOSURE: NEW TECHNIQUE, NEW TIMING

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ABSTRACT: Cleft palate has been recorded for many centuries. Until the 16th century attempts at closure were by covering or filling the clefts using artificial materials. By the 18th century sutures were used to close the palate after cauterization. By the 19th century lateral relaxing incisions were used to close the cleft at mid line. In 1861 Von Langenbeck(9,22) introduced his technique for closing the palate. Veau(9) recommended his technique to elongate the palate and to narrow the velopharyngeal space. Many specialties are involved in rectifying this problem. They comprise maxillofacial, orthodontic, ENT surgeons, as well as speech therapists.(9) However, none of these methods succeeded to provide a satisfactory solution for the problem of complete cleft palate.

In this study, 678 cases of cleft palate of varying degrees were operated during the period from January 1992 to July 2001. From these 678 cases, 48 cases (7.07%) had complete cleft lip and palate. Only 18 cases (37.5%) had bilateral complete cleft lip and palate, and 30 cases (62.5%), had unilateral complete cleft lip and palate. The results of the corrective surgical procedures were very promising. In this series of 678 cases only six cases developed residual fistula. The used technique was simple and similar to the Von- Langenbeck technique but differs in some steps. The timing of the surgical intervention was a very important factor which influenced the outcome of the closure. *(JUMMEC 2002; 2:107 - 113)*

KEYWORDS: New technique and timing for treating complete cleft palate.

Epidemiology

Etiological causes of failure of fusion of lip masses and or palatal shelves):

a) Genetic: consanguinity (7,19,20,21,37)

b) Drug medications during the early pregnancy (37).

c) Exposure to the ionizing radiation early in pregnancy (2).

Cleft lip and cleft palate are the most common congenital anomalies of the head and neck as it occurs (1) in 750 live births. In Orientals it is 1:500, in Caucasians it is 1:1000 and in Black Americans it is 0.4:1000. It was claimed that cleft lip with or without cleft palate is due to at least two pairs of recessive genes. It is more common in males than in females. Isolated cleft palate is due to a simple dominant gene with greatly dominant penetrance. The most recent suggestion shows that cleft lip with or without cleft palate is due to multifactorial etiology involving many genes and environmental factors. The isolated cleft palate is more heterogeneous. Associated anomalies are seen in cases such as Robin's Syndrome and Fallot's Tetralogy. (1,9,19,20,21)

Twenty cases, out of the 48 cases with complete cleft lip and palate, had family histories of cleft palates. Fourteen of the cases, had brothers with the similar problems. The other 6 cases had fathers with cleft lips and or prepalates. Ten cases had other concurrent congenital malformations such as Pierre Robin's Syndrome (presenting with macroglossia, micrognathia, and cleft palate), Robert's Syndrome (presenting with absent femur and thigh, delayed growth, laryngomalacia, cleft palate), Ellis-Van Creveld Syndrome (presenting with congenital heart disease and abnormalities of the extremities) and achondroplasia (1).

Incidence in Tabuk Region of Saudi Arabia

Tabuk region lies in the Northwestern part of Saudi Arabia. It is a wide district with a rapidly increasing population. It is estimated that in Tabuk the incidence of cleft palate per se is 1: 350 livebirths and the risk of

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delivering a child with combined cleft lip and palate is 1: 250. The apparent high incidence and risk of such congenital deformities among livebirths is due to several factors such as consanguinity, drug intake, irradiation and other environmental causes. For the majority of the cases the external appearance of the newborn baby was the cause of seeking medical advice. Very few cases came very late in the childhood or adulthood period.

Patients

During the period from 1/1/1992, up to end of July 2001, a total of 678 cases of cleft palate of varying degrees and over 167 cases of isolated cleft lip were operated to achieve closure. Out of the total number, 664 cases were Saudis, and 14 cases were non Saudis (Table 3). Most the cases presented to the clinic at a very early age because the parents of the newborns with cleft palates or lips were distressed by the ugly sight of the clefted babies. Six hundred (600) cases presented within the first year of age (Table 4). The majority (88%) of the cases were from educated families (Table 5).

Out of 678 cases with cleft palate, there were 48 (7.1%) cases with complete cleft palate. Eighteen (37.5%) cases had bilateral complete cleft lip and palate and 30 (62.5%) cases had unilateral complete cleft lip and palate.(table 6). The left-sided clefts represented 41.7%, right sided clefts was 20.8% of the total cases with complete cleft palate, while bilateral complete cleft palate was seen in 37.5% of the cases.

Methods

A) Immediately after birth the orthodontic surgeon was consulted to perform an artificial prosthesis to facilitate feeding.

B) Timing of surgery:

In this study the time of surgery was at the 7th to 8th month of age for the isolated cases of cleft palate without cleft lip.

In combined lip and palatal clefts, lip closure was done immediately in the first week of life. In bilateral lip clefts, surgical closure was started with the more clefted side and surgery to the other side was done two or three weeks later. The surgical interference was started in the first 8 cases of the series using the classic delayed timing after a minimum period of three months and the remaining 40 cases were treated by the new timing immediately after birth (Table 7).

Surgical treatment

A) Veau- Palatoplasty:

Veau-palatoplasty was applied, in the first 8 cases of the series. The timing of operation in these cases was following the classic one. The minimum period prior to lip closure was three months. Some cases came late at the age of one year. Other cases had been operated earlier at another facility and had failed surgical closure before coming to the author's clinic.

Table 1. Types of clefts in the series

Item	Number of cases	Percent of total cases	Percent of group
Total cases	678	100.0%	100.0%
Total complete cleft palate cases	48	7.07%	100.0%
Complete bilateral cleft palate	18	2.7%	37.5%
Complete unilateral cleft palate	30	4.4%	62.5%
Left sided unilateral	20	2.92%	41.7%
Right side unilateral	10	1.48%	20.8%

Table 2. Cases with residual palatal fistula and outcome after surgical intervention

Case	1st , 2ond&3rd&4th	5th&6th
Description	Bilateral complete	Unilateral complete
Causes	Delay in lip closure.	Inadequate closure
Site	Anterior (hole)& slit	Central slit
Outcome	Closed	Closed

Table 3. Nationality of cases with cleft palates and/or lips

Saudi Patients	Egyptians	Sudanese	Syrians	Philippines
664	3	6	4	1

Table 4. Age of cases at time of presentation to Plaastic Surgery Clinic, Tabuk Hospital

Years of age				
< 1	1-2	2-6	6-12	> 12
600	30	24	15	6

Table 5. Incidence of cases in relation to family education.

Number of cases in educated families	Number of cases in non-educated families
600 (88.4%)	78 (11.51%)

Table 6. Incidence of complete cleft palate (C.C.P)

Complete C.P.	Bilateral C.C.P	Unilateral C.C.P
48	18	30

Table 7. Comparison between the two techniques, timing of surgery and outcomes

Early intervention with the new technique	Late interference with Veau
40 cases	8 cases
2 (5%) cases had residual fistula	4 (50%) cases had fistulae
4 (10%) cases needed orthodontic	8 (100%) cases needed orthodontic
10 (25%) cases had nasal tone, less severe.	8 (100%) cases had severe nasal tone

A) bipedicled (bipolar) mucoperiosteal flaps

This technique is a modification of the Von Langenbeck technique. It involves dissection of the mucoperiosteal flaps and depend on both the anterior and posterior blood supplies. The author used this technique in the remaining cases.

Modifications

In addition, double opposing Z-plasties in the soft palate was done to elongate the palate and uvula (Furlow's technique). The first Z- plasty included the oral mucosa and the muscle layers. The second included the rest of the muscle layer and the nasal mucosa. In both techniques the other steps were greatly similar. Injection of diluted Adrenaline with Zylocaine in the palatal mucosa and submucosa was done with dissection of the mucoperiosteal flaps and fracturing of the pterygoid humulus on both sides. Wide dissection of the lateral pharyngeal wall was done. Lateral gauze packs were placed and left in place for a duration of 4, to 5 days.

Short cut of palatoglossus muscle could allow for sound healing of the suture line by relief of tension on it.

Three layers sutures were used, the first was in the nasal mucosa, the second was in the muscle layer, and the third was in the oral mucosa. The sutures were taken with a wide range in between to prevent ischaemia of the tissue.

The peiosteum of the alveolar margins is dissected and sutured after approximation of the alveolar edges near each other in unilateral cases and near the primary palate in bilateral cases.

Treatment of residual palatal fistula

The residual palatal fistula in this study were seen in six cases. Three of them presented in the form of a hole or perforation. The other 3 cases had a slit in the midline between the nasal and oral cavities. For surgical management, the author considered the fistula as a new case of cleft palate. The same procedure was done. The lateral gauze packs were applied and kept in place for a fairly longer period (5 to 7 days). Three out of the 6 cases that had palatal perforation were treated using this technique; two of which had a slit fistula, and the other had a small hole fistula. One of them showed recuurence of the fistula. In the other 3 cases with large fistulae, the patients also had a protruding premaxilla. In these cases cartilagenous grafting was placed and fixed to the mucoperiosteal flaps.

Two of them needed orthodontic surgeon.

Results

From this series of 678 cases, six of the patients had residual fistulae, which were located either anteriorly or centrally (Table 2). The fistulae presented as a slit or a hole and required closure later. Two cases needed orthodontic reconstruction because of the fronto-nasal process deformity as they had bilateral complete cleft palate and lip, with marked protrusion of the primary palate and anterior alveolar arch. Both cases were treated by Veau technique. Closure of the lip in one of them was done very late (at the age of one year) because the patient presented late after she had been subjected to three trials for lip closure at another facility and had failed to achieve closure. Of the four cases, two of them had unilateral complete cleft palate and lip. Both cases were operated early at 7 months of age, and they should have been delayed three or four months more. As for the last two cases, one of them was surgically closed by Veau technique, and in the last case the lateral packs were removed early on the second post-operative day.

Follow up of the cases

These cases were followed up. Their speech was monitored to detect any problems and the cases were reviewed to assess whether they require any further correction of the alveolar arches. A number of patients were referred to the orthodontic surgeon after completing the palatal closure.

In four of the cases with complete bilateral cleft palate and lip, there was a need for cartilaginous grafting as well as correction of the maldirected incisors and prepalate. From this series 10 patients consulted the author for the problems related to their nasal speech. The three cases are still being followed up by the speech therapist. In cases having speech with a severe nasal tone and where speech therapy had failed, pharyngoplasty was used as a last resort. Growth of paranasal sinuses and other facial bones was good in cases treated using the programmed technique.

Discussion

Cleft palate results from non fusion of palatal shelves. Two theories are involved. (8,30,31,32) Currently, a

palatal cleft can be easily closed through surgical intervention. The aims of palate closure are to separate the oral from the nasal cavity, to prevent food regurgitation from the nose, to produce the best quality of speech and to provide a cosmetically acceptable appearance in cases of complete clefts.

The soft palate is a highly motile organ and it is composed of strong muscles. Hence, the traction on the mucous membrane of the hard palate is continuous. This was counteracted in our study by careful and perfect suturing of the flaps into each other, and placing of lateral gauze packs which had many functions. These lateral gauze packs functioned as a splint to the flaps; they prevent accumulation of milk or fluids in the dissected raw areas and acted as a hemostatic cushion. These lateral packs were also essential in facilitating the future narrowing of the pharyngeal orifice because these gauze packs were placed under the dissected mucous membrane of the lateral pharyngeal walls thus inducing mild to moderate fibrosis.

Timing of surgery in bilateral complete cleft lip and palate:

Jaques (1997) and Rosenstein (1999) recommended combined integrated surgical inputs and co-operation between the surgeon and the orthodontist from time of birth to adolescence in order to achieve better or full esthetic and functional use of all dentitions. (10,25) Brauman *et al* (1999), Lukash et al (1998), Mishima *et al* (1998) and Serevans *et al* (1998), Millard (1999) and Posnick (1996) used pre-surgical casts or appliances to correct the alveolar arch deformities until the surgery for the lip was achieved. They had good results. (1,8,10,11,12,16,17, 18)

In this study the author used the lip as the best natural appliance to correct the alveolar arch deformity. For this reason, closure of the lip as early as possible was the important factor to align the alveolar arch. It produced excellent results. Paevy (1994), in France, started to close the lip in the first week of life. (15)

Ysunza *et al* (1998), published a study which included 41 patients who were operated on at the age of 12 months and 35 patients who were operated at age of 6 months (23). He discovered that the outcome for speech was significantly enhanced in the 6 months age group. These cases had no compensatory articulation disorders. Both groups had the same degree of maxillary collapse which is less in early operated cases. (5,6)

In this series, most of the isolated cleft palate cases were operated at the age of 7 months. This is the time before the patient starts to speak, and hence there will be no more distortion of growth of paranasal sinuses and the adjacent tissues which are related to the clefted palate. The baby at that age will be starting to say some words, and hence the rationale for surgical closure of the cleft palate at an early age.

In cases of complete cleft palate, the palatal surgery after the 10th month of age appear to be better for achieving adequate growth of the palatal shelves, thus giving a chance for fusion of the primary palate and the alveolar arch.

Technique of palate closure

Many techniques wrere developed and many modifications were applied. Veau technique and Von Langenbeck technique are more popular. Najmi (1999)13 used full thickness skin graft. Malek as in Pavy (1994) (15), Owmwn-Moll (1998) (14) closed the palate in two stages.

The Veau Wardill technique was used in 8 cases. It has some drawbacks. In cases of complete cleft palate, the patient may have an anterior palatine fistula, due to partial ischaemia of the anterior part of the dissected mucoperiosteal flaps.

Later, the author used a modification of the Von Langenpeck technique in the remaining cases. It has some drawbacks such as widening of the velo-pharyngeal orifice, which may need pharyngoplasty later. To overcome the drawbacks of this technique, the author did wide dissections of the mucous membrane of the lateral walls of the pharynx and packed it with gauze which encouraged later narrowing of the pharyngeal orifice. The lateral gauze packs were kept for 4 to 5 days to stimulate some fibrosis later in the area. Two Z-plasties (Furlow's procedure) were made posteriorly to elongate the antero-posterior length of the soft palate. Also, the author used to cut short the palatoglossus muscle, a step which could relief the tension on the suture lines and allowed sound healing. Periosteum over the alveolar mrgins was dissected and sutured to help alignment.

Post-operatively, the patients were closely monitored because most of the cases were in the very young age group and especially those cases with congenital syndromes who usually had narrow laryngeal lumen and soft cartilage which may predispose to postoperative stridors and suffocation.

The parameters of success of treatment of complete cleft palate in the study included good aesthetically acceptable appearance, perfect lip closure, perfect palatal closure, good alignment of the teeth, fine quality of speech and no or minimal middle ear problems in the future. Of the eight cases operated by the classic timing schedule and classic Veau technique, 4 cases developed palatal fistula (50%). All the eight cases subsequently required orthodontic management at a later stage to align the gum carrying the teeth. Out of the 40 cases treated by the new technique and the new timing only two case left a residual palatal fistula (Table 7).

Conclusion

Complete cleft palate can be managed in a systematic manner which can provide good esthetic and functional results. If the condition is accompanied with cleft lip, the surgical closure of the lip should be done immediately after birth. Ideally during the first week surgical closure should be administered.

Timing of surgery for the isolated cleft palate is 7 months and above. In cases of bilateral cleft palate and lip, it is advisable to initiate surgical intervention for lip closure early, that is, within the first week of life, and to delay surgery of the palate after the 10th month of age. Wide mucosal dissection of the walls of the pharynx, and double (Z) plasties have a beneficial effect by decreasing the size of the pharyngeal orifice, and this procedure also improves the quality of speech. Cut of palatoglossus muscle, three layer sutures, and adhesion of the periosteum over alveo;ar margins are new steps were of very good effects.

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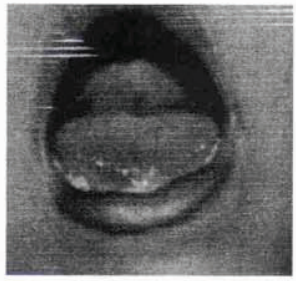
Before

After lip closure



After palate closure

CASE-2

During palate closure

After palate closure

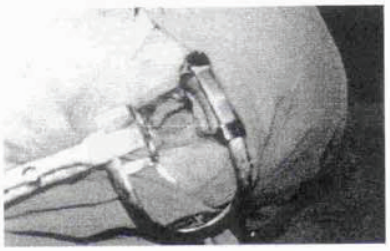
Before palate closure

After palate closure

CASE-5

Before palate closure

After palate closure



During palate closure

After palate closure and lip revision

CASE-4

Before

After lip closure

Before

After lip closure

CASE-7

After lip closure

During palate closure

Before

After lip closure