

Maxillary Growth Evaluation After Cleft Palate Repair Using Goslon Criteria: Preliminary Study

Huntal Simamora*, Evie Lamtiur**, Nur A.*, Siti Handayani*, Kristaninta Bangun*
Jakarta, Indonesia

Background: The goal of palatoplasty is to achieve normal maxillofacial growth, normal speech, and prevent hearing loss. Disturbance of maxillary growth may occur in cleft lip palate patients after palatoplasty. To determine how many patients later developed a disrupted maxillary growth following operations, a retrospective study was designed to evaluate patients with complete unilateral cleft lip and palate who have undergone two-flap palatoplasty.

Methods: A retrospective analytic study evaluated the maxillary growth of 15 consecutive unilateral cleft lip and palate patient aged around 8-year-old treated in the Division of Plastic Surgery Cipto Mangunkusumo Hospital, Jakarta. Cephalogram and dental study models were used to assess growth. Cleft lip and palate repair were performed to all patients without alveolar bone graft or any orthodontic treatment.

Result: The cephalogram shows that 53,3% of the patients developed maxillary hypoplasia post palatoplasty. Mean value of the Goslon Yardstick was 3,53 (intermediate category by Goslon criteria). No patient fell into the Goslon 1 or 5 categories.

Discussion: Disturbed maxillary growth is postulated to be caused by the manipulation and suturing of the maxillary vomer, and scarring of the dentoalveoli post-surgery. Another contributing factor is the intrinsic tissue deficiency.

Conclusion: Maxillary hypoplasia is a possible complication following two flap palatoplasty, affecting either anteroposterior, transversal and vertical maxillary growth. This finding needs to be proven especially after the process of growth ceased. It is highly probable that maxillary disruption is higher when the two flap palatoplasty technique leaves lateral areas of denuded bone on the maxillary tuberosity.

Keywords: Maxillary growth, two flap palatoplasty, Goslon Yardstick

Latar Belakang: Hasil akhir yang ingin dicapai dari operasi palatoplasti adalah tercapainya pertumbuhan maksilofasial yang normal, dapat berbicara dengan baik, dan mencegah terjadinya kelainan pendengaran. Pada pasien yang telah menjalani operasi palatoplasti kadang timbul gangguan pertumbuhan maksila. Studi ini mengevaluasi jumlah gangguan pertumbuhan maksila pada pasien dengan sumbing bibir dan langit-langit unilateral komplis tanpa kelainan lain yang telah menjalani operasi two flap palatoplasti.

Metode: Penelitian ini merupakan analisa retrospektif yang mengevaluasi pertumbuhan maksila menggunakan cephalogram dan cetakan gigi pada 15 pasien dengan sumbing bibir dan langit-langit unilateral berusia sekitar 8 tahun yang berobat ke Divisi Bedah Plastik di Rumah Sakit Cipto Mangunkusumo, Jakarta. Semua pasien tersebut telah menjalani operasi palatoplasti tanpa alveolar bone graft atau terapi ortodonti lainnya.

Hasil: Dari data cephalometri didapat kejadian hipoplasia maksila 53,3%. Hasil yang didapat di RSCM Jakarta tidak ada pasien yang masuk dalam kategori Goslon 1 maupun 5, dengan nilai rata-rata 3,53 atau masuk ke dalam kriteria Goslon intermediate.

Diskusi: Gangguan pertumbuhan maksila pada pasien yang menjalani operasi palatoplasti, disebabkan oleh manipulasi dan jahitan pada sisi tulang vomer maksila. Penyebab lain gangguan pertumbuhan maksila adalah adanya jaringan parut pada arcus dentoalveolus. Faktor lain yang menghambat pertumbuhan maksila adalah adanya defisiensi jaringan intrinsik.

Kesimpulan: Pada sebagian besar pasien sumbing bibir dan langit-langit pasca two flap palatoplasti terdapat gangguan pertumbuhan maksila baik pertumbuhan anteroposterior, transversal maupun vertikal yang perlu dibuktikan lebih lanjut saat pertumbuhan berhenti.

*From Cleft Craniofacial Center, Cipto Mangunkusumo General National Hospital. Jakarta, Indonesia

** From Faculty of Dentistry, Orthodontic Department, University of Prof. DR. Moestopo (B), Jakarta, Indonesia
Presented in the 15th Indonesian Association Of Plastic Surgery Scientific Meeting. Semarang, Java, Indonesia

Disclosure: The authors have no financial interest to declare in relation to the content of this article.

Maxillary growth is influenced by the timing of operation, cleft type, and history of prior palatoplasty.¹ Leaving lateral defect with exposed bone after palatoplasty may cause the collapse of alveolus and result in maxillary hypoplasia. Since the year 2000, our institution has implemented the Bardach two-flap palatoplasty in treating complete cleft lip. To determine whether the patients develop a disrupted maxillary growth following the operation, a retrospective study was designed to evaluate patients with complete unilateral cleft palate who has undergone palatoplasty.

MATERIALS AND METHOD

Fifteen patients with unilateral complete cleft lip and palate who underwent palatoplasty in the Division of Plastic, Reconstructive, and sAesthetic Sugery Cipto Mangunkusumo Hospital, Jakarta during the year 2002-2003 are included in the study. Exclusion criterias were: patient with bilateral cleft lip and palate, non-Bardach palatoplasty, presence of syndrome, history of prior procedure, orthodontic treatment, and a history of maxillofacial trauma. The inclusion criterias were: unilateral cleft lip and palate, repair by Bardach two-flap palatoplasty, age between 6 to 14 year-old, and willing to participate in this research.

Maxillary measurements were obtained from anteroposterior facial photographs, lateral cephalometric images, and dental casts. Cephalometric measurements follow the Georgiade points.⁴ Dental cast were evaluated from the anteroposterior, transverse, and posterior side, done twice by the same orthodontist following the Great Osmond Street, London, and Oslo, Norwegia (Goslon) Yardstick criteria. The result was categorized into 5 different groups due to complexity of the treatment.

Group 1 is excellent result where there is an overjet, average inclination of the retroincisive, with no crossbite nor openbite. Might need an orthodontic treatment to attain occlusion. Group 2 is good, where there is an overjet, average inclination or proclination of incisive, and unilateral crossbite or crossbite tendency

with or without openbite tendency. Occlusion requires orthodontic treatment. Group 3 is fair. There is an edge-to-edge bite, average inclination or proclination of incisive, unilateral crossbite with or without openbite tendency. Malocclusion can be treated by ortodonthics. Group 4 is poor and there is an overjet and or reverse overjet, average inclination incisive, unilateral crossbite with or without bilateral openbite. The defect can be treated by orthodontic treatment, however if the facial growth is unfavorable, an orthognatic surgery is required. Group 5 is very poor results, there is reversed overjet, clear incisive proclination, bilateral crossbite, poor maxillary arch and palatal vault. This defect needs orthognatics to repair skeletal malrelationship and occlusion.²

Cephalometry was used to evaluate the maxillary growth as an important radiographic examination to analyze facial deformity by measuring important skull points. The evaluation calculate the relation between the maxilla teeth and mandible, relation of the teeth to the chin, relation between the teeth, and also relation of the teeth and skull base (Fig. 1-2).³

RESULT

A total of 15 patients are evaluated, consisting of 9 boys and 6 girls. Mean age was 8,33 years old and 8,83 years old (Table 1). Distance from cranium base to maxilla (SNA) mean value is 77,4 (SD 5,77), and cranium base to mandibula (SNB) mean is 75,57 (SD 5,37). Eight patients (53,3%) has SNA value less than 79°, 6 (40%) falls within normal SNA range (79°-85°), and 1 patient's SNA is more than 85° (Table 2).

Cephalometric result shows that 53,3% of cleft lip palate patients has maxillary hypoplasia with SNA value less than 79°, and 40% with normal SNA.

Result from the dental cast evaluation shows 1 patient (7%) with Goslon 2, 5 patients (33%) with Goslon 3, and 9 patient (60%) with Goslon 4. Mean value of the Goslon Yardstick was 3,53 and this criteria falls in the intermediate category (Table 3).

Result from research in RSCM Jakarta shows there were no patient that fulfill the

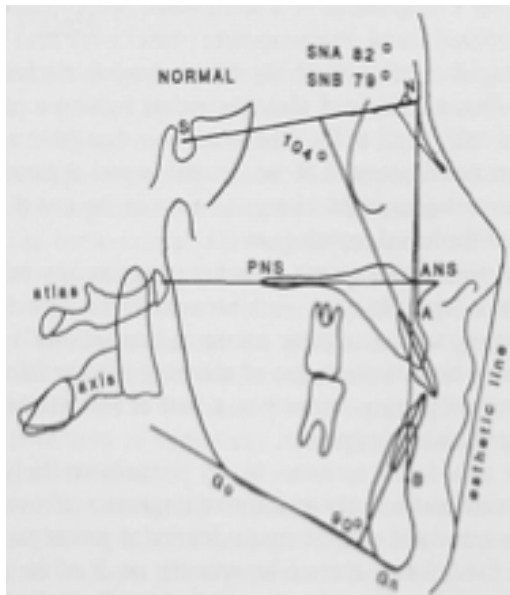


Figure 1. Relations between the points s in

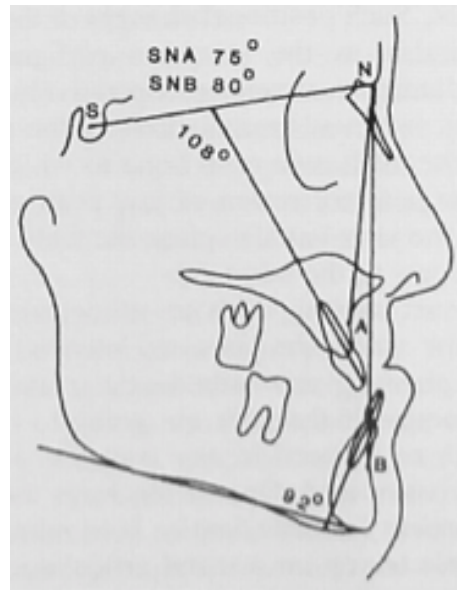


Figure 2. Cephalometric measurements

Relation between the points in cephalometry		Normal
SNA	Cranium base to A	82 ± 3°
SNB	Cranium base to B	80 ± 3°
ANB	A to B via nasion (SNA-SNB angle)	2° (5)

The intraexaminer reliability was measured using kappa test. Kappa value >0,6 is good, and very good if kappa value is >0,8.

Table 1. Mean aged according to gender

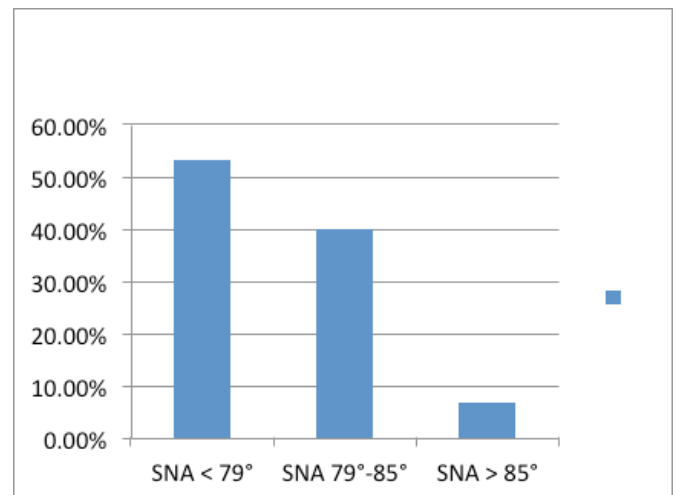
	N	%	Age (Year)		
			Mean	SD	Range
Boy	9	60	8,33	1,32	6-11
Girl	6	40	8,83	3,12	6-14
Total	15	100			

Goslon 1 (excellent) or 5 (very poor) category. Comparison with center in other country, shown in Table 4.

DISCUSSION

The goal of palatoplasty is to achieve normal maxillofacial growth, normal speech and avoid hearing loss. Previous research by Hardjowasito showed that lateral cephalometric study in adult patients with cleft lip and palate with no prior surgery did not display any maxillary

Table 2. SNA Cephalogram



growth disturbance. Hence, surgery has a great impact on the development of maxillary hypoplasia.¹¹



Table 3. Measurement result

Goslon Group	Category	Frequency	(%)
1 and 2	Good	1	7 %
3	Fair	5	33 %
4 and 5	Poor	9	60 %

Table 4. Comparison of Goslon values between countries

	N	Consecutive	Age	Goslon						Comparison	
				Mean	1(%)	2(%)	3(%)	4(%)	5(%)	Mean	SD
Sweden	97	T	7,4	12	74	13	1	0	2,02	0,54	<0,001
Austria	123	T	9,2	8	64	19	8	1	2,29	0,77	<0,001
Netherland	43	Y	9	9	52	30	9	0	2,36	0,74	0,004
England	35	T	10	0	37	31	29	3	2,97	0,89	0,004
Poland	28	Y	10,6	14	43	32	7	4	2,44	0,96	<0,001
Taiwan	60	Y	9	0	5	20	53	22	3,92	0,79	0,035
Japan	24	Y	8,3	4	4	33	55	4	3,5	0,83	0,843
Indonesia, RSCM	15	Y	8,5	0	7	33	60	0	3,53	0,64	-

* T independen test

GOSLON Yardstick is a well-established method to measure the dental arc to compare the anatomical results of cleft lip and palate repair. This clinical tool evaluates the character of malocclusion at the first stage of permanent teeth growth on a child.⁷⁻¹⁰

Bardach palatoplasty aims to improve the function of velopharyngeal mechanism to produce normal voice and reduce the development of maxillary hypoplasia by making a minimal bone-exposed defect area at the lateral sides of a palate after surgery.

To avoid speech disorder, timing of operation timing is essential. It is advised to perform an operation before the age of 2, with the drawback of disturbing maxillary growth. The best Goslon score (2,02) from Sweden shows that it is more advisable to delay the timing of repair until the age of 9-11 years.

From our research we postulate that two-flap palatoplasty technique which leaves lateral raw surface with denuded bone on the lateral sides of the maxillary tuberosity, alveolar segment might collapse and lead to a disrupted transversal growth. The growth disturbance is also caused by the present of the scar. Factors which hinder the maxillary vertical growth is due to the manipulation and suturing of the vomer side of maxilla. Another factor which

disturb maxillary growth is the scarring on the dentoalveolar arch after surgery.¹¹⁻¹²

SUMMARY

This research should be a long-term observational study, requiring a continuous follow-up until the patient reach 15-17 year-old where the maxillary growth already stop. From this study we hypothesize that the main factor disturbing maxillary growth is because the the lateral side of maxillary tuberosity is left as a denuded bone after palatoplasty. Sixty percent of the more obvious disruption of vertical and transversal growth falls into Goslon group 4.

Ethnicity or race could be a factor which distinguish the result from Indonesia with other countries. This may require further research.

Kristaninta Bangun, M.D.

Cleft Craniofacial Center. Plastic Surgery Division
 Cipto Mangunkusumo General National Hospital
 Jalan Diponegoro.No.71, Gedung A,
 Kristaninta@yahoo.com

REFERENCES

1. Salyer KE, Sng KWE, Sperry EE. Two-Flap Palatoplasty : 20-year Experience and Evolution of Surgical Technique. *Plast Reconstr Surg* 2006;118:193-204.
2. Sinko K, Caacbay E, Jagsch R, Turhani D, Baumann A, Mars M. The GOSLON Yardstick in Patients With Unilateral Cleft Lip and Palate: Review of a Vienna Sample. *Cleft Palate Craniofac J* 2008;45:87 - 92.
3. Kryger ZB, Sisco M, eds. *Practical Plastic Surgery*. Texas USA: Landes Bioscience; 2007.
4. Georgiade GS, Riefkohl R, Levin LS, eds. *Georgiade Plastic, Maxillofacial and Reconstructive Surgery*. Third ed ed. Baltimore USA: William & Wilkins; 1996.
5. Hurst CA, Eppley BL, Havlik RJ, Sadove AM. Surgical Cephalometric : Applications and Developments. *Plast Reconstr Surg* 2007;120:92-104.
6. Fudalej P, Hortis-Dzierzbicka M, Obloj B, Miller-Drabikowska D, Dudkiewicz Z, Romanowska A. Treatment Outcome After One-Stage Repair in Children With Complete Unilateral Cleft Lip and Palate Assessed With the Goslon Yardstick. *Cleft Palate Craniofac J* 2009;46:374-80.
7. Choudhary S, Cadier MAM, Shinn DL, Shekhar K, McDowall RAW. Effect of Veau-Wardill-Kilner Type of Cleft Palate Repair on Long Term Midfacial Growth. *Plast Reconstr Surg* 2003;111:570-82.
8. Rateitschak KH, Wolf HF, eds. *Color Atlas of Dental Medicine, Orthodontic - Diagnosis*: Thieme; 1993.
9. Mars M, Plint DA, Houston WJ, Bergland A, Semb G. The Goslon Yardstick : A New System of Assesing Dental Arch Relationship in Children with Unilateral Clefts of the Lip and Palate. *Cleft Palate J* 1987;24:315-22.
10. Hathorn I, Harry DR, Mars M. The Goslon Yardstick Applied to a Consecutive Series of Patients with Unilateral Cleft of the Lip and Palate. *Cleft Palate Craniofac J* 1996;33:495-6.
11. Hardjowasito W. *Studi Sumbing Bibir dan Langit-langit Unilateral pada Penderita-penderita akil baliq yang belum dioperasi*. [Disertation]. Surabaya: Airlangga University; 1989.
12. Friede H. Maxillary Growth Controversies After Two-Stage Palatal Repair With Delayed Hard Palate Closure in Unilateral Cleft Lip and Palate Patients: Perspectives From Literature and Personal Experience. *Cleft Palate Craniofac J* 2006;44:129-36.

Multidisciplinary Approach in Treating Undiagnosed Severe Temporo Mandibular Joint Ankylosis : A Case Report

Afriyanti Sandhi*, Evie Lamtiur Pakpahan**, Siti Handayani*, Kristaninta Bangun*
Jakarta, Indonesia

Background: Temporo Mandibular Joint (TMJ) ankylosis refers to bone or fibrous adhesion of the anatomic joint component and the ensuing loss of their function. The TMJ forms the very cornerstone of craniofacial integrity and hence its ankylosis in growing children adversely affects the growth and development of the jaws and occlusion. Difficulty in mouth opening and mastication, poor oral hygiene and rampant caries pose a severe physical and psychological burden in the tender minds of children.

Patient and Method: Bony ankylosis on the right TMJ in a female patient was not diagnosed until the patient reached her early teens, at which the condition was treated by bony fusion release on the right condyle. We managed the patient for further orthognathic surgery (Le Fort I Osteotomy and Bilateral Sagittal Split Osteotomy) to correct the skeletal deformity.

Result: In collaboration with the Orthodontist for pre-surgery and post-surgery orthodontic treatment, and Physiotherapist for mouth opening and masticatory muscles exercises, a good functional and aesthetic result was achieved.

Summary: Multidisciplinary approach in treating severe TMJ ankylosis is mandatory to achieve the optimum results. Awareness among all plastic surgeon and dentist involved in the treatment of craniofacial pathologies in children must be build to allow early diagnosis and treatment.

Keywords: *TMJ ankylosis, orthognathic surgery, pre and post-surgery orthodontic treatment*

Latar Belakang: Ankylosis pada TMJ didefinisikan sebagai adhesi tulang atau jaringan lunak pada sendi TMJ yang menyebabkan kerusakan fungsi persendian. TMJ memegang peranan penting pada integritas kraniofasial, sehingga ankylosis yang terjadi pada masa tumbuh kembang dapat mengganggu oklusi dan pertumbuhan rahang. Kesulitan pasien untuk membuka mulut dan mengunyah, disertai higiene oral yang buruk dan karies gigi, dapat menyebabkan gangguan fisik dan psikologis pada anak-anak.

Pasien dan Metode: Kami melaporkan kasus pasien anak perempuan dengan ankylosis tulang pada regio TMJ kanan yang tidak terdiagnosis hingga usia remaja. Operasi pertama yang dilakukan adalah melepaskan fusi tulang di kondilus TMJ kanan. Selanjutnya dilakukan operasi ortognatik yaitu Le Fort I Osteotomy dan Bilateral Sagittal Split Osteotomy untuk memperbaiki deformitas pada tulang-tulang wajah.

Hasil: Dengan tatalaksana multidisiplin bersama sejawat Orthodontist dan Physiotherapist untuk perawatan gigi geligi pra dan pasca operasi, serta latihan otot-otot pengunyah, pasien menunjukkan hasil operasi yang baik dari segi fungsional dan estetik.

Ringkasan: Pendekatan multidisiplin untuk penanganan ankylosis TMJ yang berat mutlak diperlukan demi mencapai hasil terapi yang optimal. Kepedulian yang tinggi harus dibangun di kalangan dokter bedah plastik dan dokter gigi yang terlibat penanganan kasus kraniofacial sehingga penegakan diagnosis dini dan tatalaksana dapat dilakukan dengan segera.

Ankylosis is a Greek terminology meaning 'stiff joint'. It can be defined as inability to open mouth due to either a fibrous or bony union between the head of the condyle and the glenoid fossa. There is an intra-capsular union of the disc-condyle complex to the temporal articular surface that restricts mandibular

movements, including the fibrous adhesion or bony fusion between condyle, disc, glenoid fossa and eminence.¹

Temporo Mandibular Joint (TMJ) ankylosis is most commonly associated with trauma (13-100%), local or systemic infection (10-49%), or systemic disease (10%), such as ankylosing spondylitis, rheumatoid arthritis and psoriasis. Ankylosis can also occur as a

*From Cleft Craniofacial Center, Cipto Mangunkusumo General National Hospital. Jakarta, Indonesia

** From Faculty of Dentistry, Orthodontic Department, University of Prof. DR. Moestopo (B), Jakarta, Indonesia Presented in European Craniofacial Congress 2011, 14-17 Sept, in Salzburg, Austria. Europe.

Disclosure: *The authors have no financial interest to declare in relation to the content of this article.*