



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم



شبكة المعلومات الجامعية التوثيق الإلكتروني والميكروفيلم



HANAA ALY



شبكة المعلومات الجامعية
التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات



يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



HANAA ALY

Effect of Nutrition on the Outcomes of Alveolar Cleft Grafting: A Baseline Audit

Thesis

*Submitted to the Faculty of Dentistry, Ain Shams University for partial
fulfillment of the requirements for master's degree in Oral and
Maxillofacial Surgery*

Presented by

Khaled Sherif Abdelmonime Gamil

B.D.S 2012

Ain Shams University

Supervisors

Marwa Abdelwahab Elkassaby

Professor of Oral and Maxillofacial Surgery,

Faculty of Dentistry, Ain Shams University

Amr Amin Ghanem

Associate Professor of Oral and Maxillofacial Surgery,

Faculty of Dentistry, Ain Shams University

Mahmoud Yehia Abdul Aziz

Lecturer of Oral and Maxillofacial Surgery,

Faculty of Dentistry, Ain Shams University

Faculty of Dentistry
Ain-Shams University
2020

Acknowledgement

Special thanks are due to all my colleagues and friends at the department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Ain Shams University; department of Oral and Maxillofacial Surgery National Bank Hospital for Integrated Care and department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Egyptian Russian University, for their support and help with this work, with appreciation to:

1. **Dr. Yasser Elhadidi**, *lecturer, Oral and Maxillofacial Surgery Department*, for his knowledge, support and providing assistance when needed. I deeply appreciate his mentorship and I will always deeply grateful.
2. **Nader Sameh**, *resident, Oral and Maxillofacial Surgery Department*, for his continuous support and help throughout the thesis.
3. **Hossam El-dien Hany**, *assistant lecturer, Oral and Maxillofacial Surgery Department*, for his help in the interpretation of the radiographs.
4. **Ahmed Basyouny**, for his continuous support and help throughout the thesis.

Dedication

“For the ones who believe in me My Mother and My Father”. I would not have accomplished anything without your guidance and support.

*“For my dear wife **Radwa** and son **Zeyad** without your help this work won't see light”*

*“Special Dedication for my brother and soul of my father grandmother **Teta**”*

List of Contents

Introduction.....	1
Review of literature.....	3
Cleft lip and palate percentage, causes, associated problems and multidisciplinary care.....	3
Surgeries required for CLP.....	4
The Alveolar Cleft.....	5
Types and sources of bone grafting.....	8
Alveolar cleft grafting surgery.....	10
Factors affecting wound healing.....	12
Aim of the study.....	21
Patients and Methods.....	22
I. Grouping.....	23
II. Preoperative Preparation:.....	24
III. Surgical procedure:.....	38
Anesthesia and patient preparation:.....	38
Surgical technique:.....	39
Postoperative phase:.....	48
IV. Methods of Evaluation.....	52
V. Results presentation and Statistics.....	56
Results.....	57
A. Laboratory Assessment.....	58
B. Clinical Assessment.....	59
C. Radiographic Assessment.....	64
Discussion.....	74
Summary and Conclusion.....	87
Recommendation.....	89
Appendix.....	90
References.....	100
Arabic Summary.....	115

List of abbreviations

ABG:	Alveolar Bone Grafting
AC:	Alveolar Cleft
ACG:	Alveolar Cleft Grafting
ACPA:	American Cleft Palate-Craniofacial Association
AIC:	Anterior Iliac Crest
AICG:	Anterior Iliac Crest Graft
ALT:	Alanine Transaminase
AST:	Aspartate Aminotransferase
A/G:	Albumin/ Globulin
BCLP:	Bilateral Cleft Lip and Palate
CBCT:	Cone Beam Computed Tomography
CCC:	Cleft Care Center
CL:	Cleft Lip
CLP:	Cleft Lip and Palate
CP:	Cleft Palate
CSAG:	Clinical Standards Advisory Group
CT:	Computerized Tomography
ONF:	Oro-Nasal Fistula
OPG:	Orthopantomogram
RDA:	Recommended Dietary Allowance
TIBC:	Total Iron Binding Capacity
TPA:	Transverse Palatal Arch
UCLP:	Unilateral Cleft Lip and Palate
UL:	Upper Tolerable Limit
VPI:	Velopharyngeal insufficiency

List of Tables

Table 1: Table showing the different Vitamins, examples, and daily dose	32
Table 2: Table showing the different Minerals, examples, and their daily dose.....	33
Table 3: Table showing the Labs of group I before and after diet modifications and supplementation.	58
Table 4: Table showing clinical and radiographic outcomes	67
Table 5: Table showing the incidence of post-operative Dehiscence in both Groups	68
Table 6: Table showing the incidence of pre-operative ONF in both groups	69
Table 7: Table showing the percentage of post-operative ONF in both groups	70
Table 8: Table showing a comparison between the two groups according to the Bergland- Scale	71
Table 9: Correlation between serum Fe change and Bergland scale	72
Table 10: Correlation between serum Ferritin change and Bergland scale	72
Table 11: Correlation between serum TIBC change and Bergland scale ...	72
Table 12: Correlation between serum Cu change and Bergland scale	72
Table 13: Correlation between serum Zn change and Bergland scale.....	73
Table 14: Correlation between serum A/G ratio change and Bergland scale	73

List of figures

Figure 1: Diagram showing preoperative preparation steps.....	24
Figure 2: Diagram showing the ideal components of an ideal diet.	30
Figure 3: Preoperative extraoral photography. A: Frontal View, B: Right Lateral View, C: Left Lateral View D: Intraoral View	35
Figure 4: Orthodontic appliances. A: Fan shaped expander, B: Trans Palatal Appliance	36
Figure 5: A: Unilateral alveolar cleft defect. Labial side preparation (B-D). B: Sulcular incision performed on both labial sides of the cleft. C: Papilla sparing incision extending to the first permanent molar tooth on both sides and vertical releasing incisions. D: Reflection of the labial mucosa.....	45
Figure 6: Nasal side preparation. A: Reflection of nasal mucosa to expose ONF, B: Closure of the nasal Layer.....	45
Figure 7: Iliac Crest Bone harvesting by Medial Cortico-cancellous approach. A: Gloved hand compression above the anterior ilium on the abdomen to bring the incision over the crest of the ilium. B: Incision through Skin and Subcutaneous tissue. C: Exposure of the anterior iliac crest. D: Osteotomies of the medial corticocancellous bone harvest from the anterior ilium. E: Exposed cancellous marrow after bone harvesting. F: Harvested Cancellous bone from the Anterior Iliac Crest compressed in preparation for insertion recipient site.....	46
Figure 8: Graft insertion A: Cancellous bone graft inserted and packed until overfilling is achieved. B: Cortex is onlayed and fixed by self-drilling screws.	47
Figure 9: Fat harvesting. A: Harvesting fat graft from the subcutaneous area in the anterior ilium region. B: Harvested fat graft. C: Fat graft inserted into the recipient site covering the bone graft.....	47
Figure 10: Donor site and Recipient site closure. A: Suturing of the mucoperiosteal flap using Vicryl 4.0 interrupted sutures for both sides. B: Closure of donor site by 5-0 blue polypropylene suture in subcuticular manner.....	48
Figure 11: Diagram showing methods of evaluation.	52
Figure 12: Description of the Bergland Scale ⁽³⁸⁾	54
Figure 13: Normal soft tissue healing after 6 months. Arrow is indicating right canine is about to erupt (Patient #11 group 2).	62

Figure 14: Wound dehiscence at the ACG site (Patient #2 Group 1) 10 days postoperatively with discharge and arrow is pointing towards the dehiscence site.	62
Figure 15: Wound dehiscence at the ACG site (Patient # 1 Group 1) after two months and the arrow indicates the dehiscence site.	62
Figure 16: Healing (Patient #4 Group 2) with ONF after 1 year follow up with the arrow pointing towards the ONF.	62
Figure 17: Donor site healing 10 days postoperatively. (Patient #2 of Group 1)	63
Figure 18: Picture showing Bergland type I.....	65
Figure 19: Picture showing Bergland type II	65
Figure 20: Picture showing Bergland type III	66
Figure 21: Picture showing Bergland type IV	66
Figure 22: Bar chart representing the incidence of post-operative Dehiscence in both groups.....	68
Figure 23: Bar chart representing the incidence of pre-operative ONF in both groups	69
Figure 24: Bar chart representing the incidence of post-operative ONF in both groups	70
Figure 25: Bar chart presenting a comparison between the two groups according to Bergland Scale	71

Orofacial clefts are the commonest congenital anomalies of head and neck and present in about 1/700 live births through the world.⁽¹⁾

The best treatment option for a cleft lip and palate patient (CLP) requires a multidisciplinary team approach. However, the most accepted approach for the management of patients with craniofacial anomalies according to the American Cleft Palate-Craniofacial Association (ACPA) guidelines, is the presence of specialists' interdisciplinary team.^(2,3)

There are three basic operations for CLP patients; the first one is the surgical repair of cleft lip which should be within the first 12 weeks of life. The surgical closure of cleft palate should be done by the age of 18 months and good results are achieved when it is earlier. Finally, the closure of residual alveolar cleft which should be grafted before the permanent maxillary teeth eruption in the cleft region and the timing of the operation should be collaborated with the orthodontist.⁽³⁾

The technique of choice remains the Secondary alveolar grafting, where early secondary grafting is done at 6-8 years of age; while secondary grafting is done at 9-12 years of age and finally the late secondary grafting is done after eruption of the canine.⁽⁴⁾

The bone graft source depends on the size (volume) of the defect. Ideally, cancellous iliac bone graft harvested from the anterior iliac crest is always the bone graft source of choice.⁽⁴⁾

According to the Clinical Standards Advisory Group (CSAG), success of the Alveolar Bone Grafts is 58%. Assessment of the Alveolar cleft grafting (ACG) can be done using the Bergland scale. It is a four-point assessment score of the inter alveolar height after bone

grafting. Types I and II are considered successful, while types III and IV are considered failure according to CSAG.⁽⁵⁾

The success of ACG depends on several variables as: patient's details (for example age, status of tooth eruption on the cleft side, cleft details, and the patient's general health), conditions of the surgical wound (overall oral health, blood supply, amount and quality of soft and hard tissue adjacent to the cleft, donor site, and scar tissue from previous operations) and the technical characteristics (the surgeon's experience and the graft material).⁽⁶⁻⁹⁾

One of the most important factors that is overlooked in cleft literature, that affects wound healing is nutrition. The oral and maxillofacial surgery literature is utterly deficient as regarding to this important topic.

Therefore, conducting a study to investigate the effect of nutrition on the outcomes of ACG could be of added scientific value and can be used as a baseline audit for further studies in this critical aspect.

- **Cleft lip and palate percentage, causes, associated problems and multidisciplinary care:**

Cleft lip and palate is the most common facial anomaly, being a congenital defect affecting about 3.97 per 5,000 of live births. Its frequency is different according to gender and site, for example cleft lip is 2:1 and cleft palate is 1:2 male: female ratio accordingly.⁽¹⁰⁾

Cleft lip and palate etiology is multifactorial, where both genetic and environmental factors are implicated. Cleft and/or palate can be part of syndromes like Van der Woude Syndrome, Hemifacial Microsomia, DiGeorge Syndrome, Stickler Syndrome and Ectodactyly Ectodermal Dysplasia and clefting syndrome.^(11,12)

Cleft lip and palate include a heterogeneous group of defects with large volume and shape variations. Those children and adults usually have speech, hearing and feeding problems. In addition to that, patients with isolated cleft palate (CP) show an increased prevalence of abnormal middle ear status compared to non-cleft palate children. This is due to dysfunction of the Eustachian tube. The muscles that open and close the tube cannot contract properly and dilate the Eustachian tube.⁽¹³⁾

Children affected require multidisciplinary care, including speech therapists, psychologists, pediatric dentists, cleft surgeons, otolaryngologists, and orthodontists from birth to adolescence. Dental anomalies are often found in patients with clefts. Dental abnormalities include supernumerary teeth, tooth agenesis, fused teeth, microdontia, taurodontism and ectopic eruptions.⁽¹⁴⁾