شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

بسم الله الرحمن الرحيم

HANAA ALY

شبكة المعلومات الجامعية

التوثيق الالكتروني 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

Accuracy Assessment of Occlusal Repositioning Wafer Construction Using Virtual Planned Model Surgery

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

By

Omar Ahmad Mahmoud Gamal Al-Dine Hamad

BDS 2011

Faculty of Dentistry - Misr International University

Supervisors

Heba Abdelwahed Sleem

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

Anas Mohammad Almukhtar

Honorary Research fellow - Glasgow University, Scotland UK

Lecturer of Orthodontics

Faculty of Dentistry - University of Mosul, Iraq

2021


بسم الله الرحمن الرحيم

Acknowledgement

My sincere gratitude to Prof. Mohamed Ayoub Professor of Oral Pathology, Ain Shams University - Vice president at Nahada University, for his strong support, kind understanding and fatherly care.

Many thanks and appreciation to Dr. Eman Shaheen, Clinical Engineer, Dept. Maxillofacial surgery, UZ Leuven for her precious tips and for the answers she provided.

Many thanks to my senior staff and colleagues in the department of oral and maxillofacial surgery - Ain Shams University, specially Hossam Hany for his dedicated effort.

Table of Contents

List of Abbreviations

BSSO	Bisagittal Split Osteotomy
CBCT	Cone Beam Computed Topography
CAD/CAM	Computer Aided Design / Computer Aided Manufacture
CMF	Cranio-Maxillofacial
TMJ	Temporomandibular Joint
ISO	International Organization for Standardization
DICOM	Digital Imaging and Communications in Medicine
CT	Computed Topography
MRI	Magnetic Resonance Imaging
MSCT	Multi-slice Computed Topography
ROI	Region of Interest
FOV	Field of View
STL	Standard Triangle Language
AO	Arbeitsgemeinschaft für Osteosynthesefragen (German)
ASA	American Society of Anesthesiology

List of Figures

List of Tables

Introduction

The face is a unique body part, it identifies one human from another and represents the person to a great extent. Self-esteem and body image are widely affected by how a person's face looks like. Facial deformities caused by trauma, pathology and congenital and developmental anomalies affect the person's psychology as well as social integration and well-being. MacGregor (1970) highlighted that people suffering from facial deformities even minor ones as protruded anterior teeth are victims to sarcasm and negative comments. Corrective jaw surgeries and orthognathic treatment are very useful in addressing both functional and aesthetic needs that are difficult or even impossible to treat with orthodontic procedures and conservative treatments (Ayoub, 2014).

For the past fifty years surgical techniques and planning methods have been evolving to treat developmental and acquired cranio-maxillofacial deformities restoring the symmetry, maxillo-mandibular relationships and facial dimensions (Bell, 2011). Number of surgeons and practitioners using virtual reality, computer aided design and computer aided manufacturing (CAD/CAM) to treat complex and challenging CMF case is increasing every day (Schramm et al., 2007).

The planning of orthognathic and maxillofacial surgeries is shifting from conventional methods and moving towards virtual and computer aided technologies. This shift required the assessment and evaluation of these virtual methods and techniques.

Review of Literature

1. Face beauty impact:

"Beauty as we feel it is something indescribable; what it is or what it means can never be said."

George Santayana, The Sense of Beauty (1896).

It has been found that the community perceives attractive beautiful people more positively than people who are considered unattractive and offers them better opportunities on many social aspects as they are treated better (Langlois et al., 2000). That was also evident among children (Little et al., 2011).

In 2009, Sui and Liu conducted an experiment where they illustrated how humans are attracted to facial beauty even in the presence of other visual. Candidates participating in the experiment could not ignore being drawn to faces rated as attractive (Sui & Liu, 2009). The literature is lacking data about the frequency and demographic distribution of dentofacial deformities.

2. Nature and Evolution of Orthognathic surgery:

Orthognathic surgery is defined as correction of deformities of the jaw and the associated malocclusion. Deformities include esthetic deformities, TMJ dysfunctions, deformities causing sleep apnea and others. These deformities are skeletal and impossible to be corrected or masked by orthodontic treatment alone.

Hullihen's procedure performed in 1849 in the United States is the origin of orthognathic surgery and malocclusion correction, surgeries were limited to the mandible. Also von Lengenbeck, Dufourmentel and others reported and executed similar maxillofacial surgeries but true origins were the "St. Louis operation" established by the cooperation of orthodontist Edward Angel and surgeon Vilray Blair (Steinhäuser, 1996) (Naini, 2016).

In 1917 Soerensen plated comminuted bone fracture with a golden wedding ring. Spiessl was the first to apply rigid fixation in orthognathic cases, he used screws for fixation of the sagittal split osteotomies (Spiessl, 1974).

September 5, 1969 is claimed to be the birthday of orthognathic surgery when the famous Obwegeser made his first sagittal split osteotomies and LeFort I osteotomy simultaneously in a single case for correction of malocclusion and patient profile (Obwegeser, H. L., 2007). He described that case as maxillary advancement and mandibular set back. Planning was simply made by profile tracing on a transparent sheet placed on the original cephalometric radiograph then roughly estimated the amount of movement needed, the final decision was to be made in the operation theater. Fixation was made using wires and bone grafting with the patient placed after the operation in intermaxillary fixation for six weeks. Obwegeser published that work in 1970 (Obwegeser, H., 1970; Obwegeser, H. L., 2007).

Luhr was considered as the first to use miniplate and screw for orthognathic fixation and midface fractures fixation (Drommer & Luhr, 1981). This attempt was followed by Champy and others who developed their own mini plates sets (Mohd et al., 2019).