Chapter Ten

Maxillofacial Surgeon: Where Are You?

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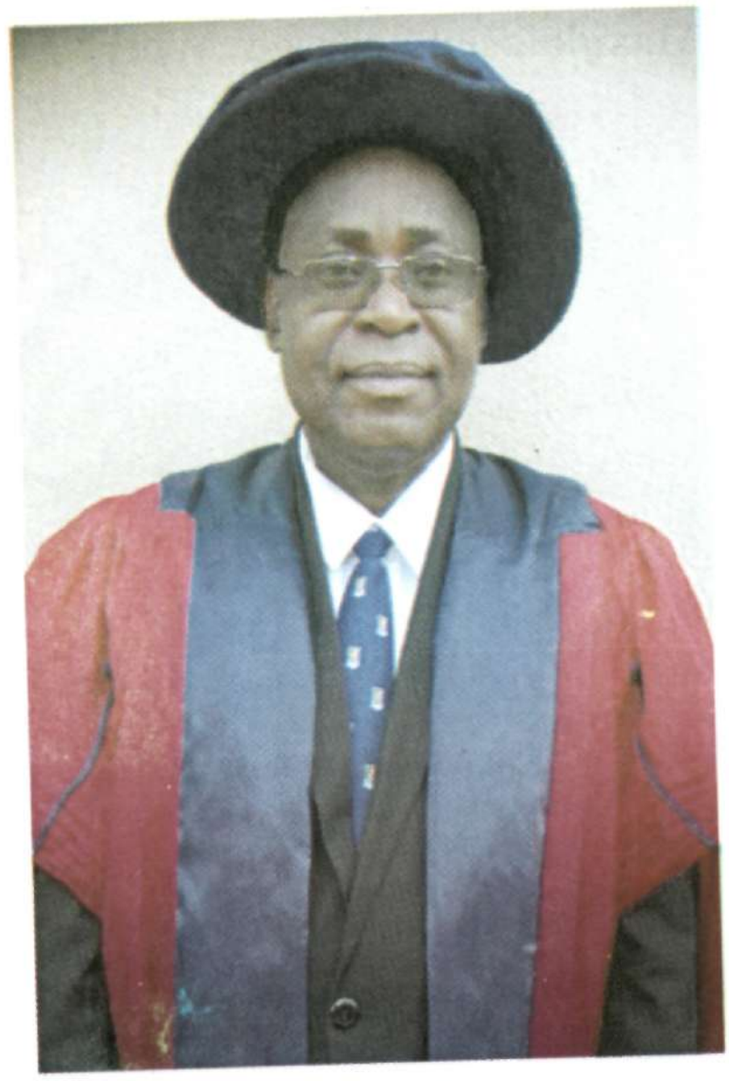

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Preamble

I thank the Almighty God and the authority of Ahmadu Bello University, Zaria, and the Faculty of Medicine of this great university and my Department for affording me the opportunity to deliver this inaugural lecture on behalf of the Faculty. I am aware that this is the fifth lecture from the Faculty of Medicine and the first from the Department of Dental Surgery. I pray that it should also be the last. Not that I do not wish others behind me well but rather wish they would present under the Department of Maxillofacial Surgery, Faculty of Dental Surgery, College of Medicine, Ahmadu Bello University, Zaria in the nearest future.

The purpose of an inaugural lecture like this is to allow the lecturer to showcase his journey and contributions made to the academic world, Mr. Vice-Chancellor Sir, it is on this premise that I intend to take this august gathering through my journey as an academia in the Maxillofacial Unit, of the Department of Dental Surgery from 1995 to date, and while doing this, I will try as much as possible not to spice this lecture with excessive medical and maxillofacial jargons.

Casting my mind back to my childhood days particularly during my secondary school sessions revealed that the choice of carrier was between medicine and engineering, (architecture to be precise) and piloting. At the interview for my A-level admission in 1979, the vice-principal of CMS Grammar School, Bariga, Lagos asked me: "Young man, Biology or Mathematics?" and while still thinking of what to say, I was pushed to biology class, thus setting the pace for my journey into the medical world.

During my first year, in the A-level class, I sat for JAMB with the premier University, University of Ibadan as my first and second choices, and Dentistry as the only choice for course of study.

I was admitted into Dentistry in October 1980 and graduated in October 1986. Initially, I was interested in conservative dentistry where the money is, but soon realised that I will be bored filling teeth and coupled with the limited facilities for training in the specialty then. With these I had a re-think to consider another specialty.

Why maxillofacial Surgery of all the subspecialties in Dental Surgery? Mr. Vice-chancellor Sir, this was based on the influence of some of my lecturers, the charismatic Dr. Toks Abiose, Prof. Lawoyin JO, Prof. Lawoyin DO and off course the most luring to maxillofacial surgery was by Prof Adekeye EO, the first professor of oral and maxillofacial surgery in the Department whom I often refer to as the oracle of maxillofacial surgery during one of his lectures to the post graduate students of the west African College of Surgeons which I was opportune to attend in 1986 as a final year student. I was captivated and mesmerized during his description of the Bakamjian flap which I later came to realize is the deltopectoral flap. This eminent scholar eventually became my mentor.

Sir, you may ask why the choice of the title: **Maxillofacial Surgeon: where are you?** Why not 'By their teeth ye shall know them' after this entire lecturer is from the Department of Dental Surgery or 'by their faces ye shall know them', as this is related to maxillofacial surgery under which I have practiced for 19 years or why not ''the bold and the beautiful faces in Kaduna''

One of the reasons for this is because the population knows little or nothing about Maxillofacial Surgery, usually upon my being introduced as a maxillofacial surgeon I am often asked a battery of questions, such as: what do you really do? How is it different from plastic surgery? and so forth and I am quick to always remind them of the importance of the face and in particular the oral cavity, more also, that the first maxillofacial surgeon was actually the Son of God, Jesus Christ who died for you and me. Furthermore, the word ''face'' is mentioned in the Holy Bible 444 times thus showing its importance while ''teeth'' (its actions and effects) are mentioned only in 46 verses.

Another is to show the inter-relationship and the thin divide between the subspecialties working in the maxillofacial arena.

Oral and maxillofacial Surgeon, where are you? While not playing the role of the Almighty God as it in is in Genesis 3: 19. I

dare ask this question which will be of tremendous interest to this distinguished audience as we review the scope and practice of oral and maxillofacial surgery in our university and the world at large.

The oral and maxillofacial region.

The mouth, also called the oral cavity, is bounded laterally and in front by the alveolar process (containing the teeth, posteriorly by the isthmus of fauces, superiorly or the roof by hard palate and soft palate and inferiorly or the floor of the mouth by the mylohyoid muscles, occupied mainly by the tongue (German and Palmer, 2006; Probst et al., 2006) (Fig. 1). The tongue is one of the most powerful organs in the body, a claim the Holy Bible attests to as it appears in 160 verses. What would the world be like without a tongue? (Fig. 2).

Fig 1. Anatomy of the oral cavity

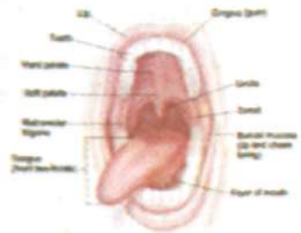


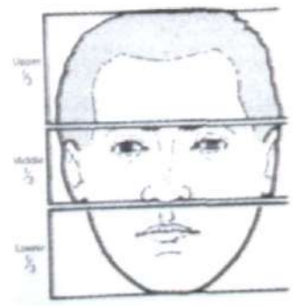
Fig 2. The mouth without a tongue

The mucous membrane lines the sides and under surface of the tongue to the gum lining the inner aspect of the mandible. It receives the secretions from the submaxillary and sublingual salivary glands.

The face or maxillofacial region is the portion of the body that occupies the region between the hairlines superiorly and the chin inferiorly (Larrabee et al., 2004; Prendergast, 2013) and between the ears (Sinnatamby, 1999) (Fig. 3a).

Fig 3a. Maxillofacial region.

Fig 3b. Division of the face into three parts.



The face is the object of attraction in the human depicting the personality. It is an important physical feature for complex social interaction in our everyday life (Bhattacharya, 2012). It is the central focus in all our everyday interpersonal relationships. It depicts the psychological state of the individual and is the physiognomy of an individual. The face gives an impression and expression of the human. However, according to Shakespeare's Macbeth, " there is no art to find the mind's construction in the face". Hence distortion of the facial tissues whether due to trauma or oncological services requires the services of a maxillofacial surgeon.

The face though, small in size is mighty in position as it harbours important organs for smell, sight, hearing and taste. It is the object of beauty and attraction or otherwise, it depicts an individual's personality. The face is divided into three parts; the upper third, the middle third and the lower third (Fig. 3b).

What is oral and maxillofacial surgery? Oral and maxillofacial surgery is defined as that part of Dental Surgery which deals with the diagnosis, surgical and adjunctive treatment of diseases, injuries and defects of the human jaws and face, the oral cavity and the associated structures (Srinivasan, 2004). It has strong identification with dentistry and surgery. Oral and maxillofacial surgery is strongly associated with the other surgical specialties as it is based on similar surgical principles.

Who then is an oral and maxillofacial surgeon? An oral and maxillofacial surgeon is a regional specialist surgeon treating the

entire craniomaxillofacial complex: anatomical area of the mouth, jaws, face, skull, as well as associated structures.

Some surgical treatments performed on the craniomaxillofacial complex include:

a. Dentoalveolar surgery (surgery to remove impacted teeth, difficult tooth extractions, extractions on medically compromised patients, bone grafting or preprosthetic surgery to provide better anatomy for the placement of implants, dentures, or other dental prostheses).
b. Surgery to insert osseointegrated (bone fused) dental implants and maxillofacial implants for attaching craniofacial prostheses and bone anchored hearing aids.
c. Cosmetic surgery of the head and neck: (rhytidectomy/facelift, browlift, blepharoplasty/Asian blepharoplasty, otoplasty, rhinoplasty, septoplasty, cheek augmentation, chin augmentation, genioplasty, oculoplastics, neck liposuction, lip enhancement, injectable cosmetic treatments, botox, chemical peel, etc.)
d. Orthognathic surgery: Surgical treatment and/or splinting of sleep apnea, maxillomandibular advancement, genioplasty.
e. Tumours and cysts: Diagnosis and treatment of benign pathology (cysts, tumors etc.), malignant pathology (oral & head and neck cancer) with (ablative and reconstructive surgery, microsurgery), cutaneous malignancy (skin cancer).
f. Treatment of congenital craniofacial malformations such as cleft lip and palate and cranial vault malformations such as craniosynostosis, (craniofacial surgery).
g. Chronic facial pain disorders.
h. Management of temporomandibular joint (TMJ) disorders.
i. Soft and hard tissue trauma of the oral and maxillofacial region (jaw fractures, cheek bone fractures, nasal fractures, LeFort type fractures, skull fractures and eye socket fractures).

Historical review of Oral and Maxillofacial Surgery

At the beginning, Dentistry was confined to the mechanical aspects of the teeth while the surgical aspects of the oral cavity were cared for by general surgeons. You may be surprised to learn that oral surgery has roots that trace all the way back to between 500-300

BCE, when historians found writings from Hippocrates and Aristotle discussing the practice of everything from tooth extraction to wired jaws and teeth. Later in 1210 CE, a group of barbers in France formed a group of surgeons that were separated by advanced and less advanced surgeries. The group is one of the earliest known oral surgery organizations.

The modern history of oral and maxillofacial surgery originated with the American Civil War. The World Wars and the surgical care for battle field injuries brought about dramatic advancements in surgical techniques and anesthesia. Most of the modern techniques came out of the lessons of that era coupled with the great scientific advancements since World War II. Although the oral surgery field has made many improvements, the constant improvement in materials, methods and nanotechnology hold great promises for the future. The 1900's showed great advances in industry and science. By the early 20th century, dentists limited to extractions and minor dentoalveolar surgical procedures were recognised which subsequently gave birth to the Society of Exodontists in 1918. Some members of the society pioneered cleft palate and other facial reconstructive surgery. During that time too, revolutionary advancements were made in the treatment of facial fractures for the Union and Confederacy. Their innovations continued through the 1920s, when they pioneered many of the procedures that serve as the foundation for cosmetic surgery today and thus formed the basis for the specialty called the oral and maxillofacial surgery today. As the 20th century progressed, oral and maxillofacial surgeons developed many current trauma techniques through their experiences with the dire injuries of soldiers in World War II, Korea, Vietnam and the Gulf War.

The earliest full-fledged maxillofacial surgical unit was established during the period of the Nigerian civil war as the Maxillofacial Army to take care of the battle casualties. After the civil war it became known as Maxillofacial Unit under the Department of Surgery, Ahmadu Bello University and Ahmadu Bello University Teaching Hospital then in Kaduna. The unit was subsequently excised from the Department of Surgery to form the present day Dental Surgery Department when a Departmental Chair was approved. As in many other countries, the oral and

maxillofacial Unit was established to manage battle casualties from the civil war.

What is the goal of oral and maxillofacial surgery?

The goal is the correction of facial deformity, eradication of facial surgical diseases, prevention of recurrence or complication and the restoration of function.

Scope of oral and maxillofacial surgery.

To understand the scope of oral and maxillofacial surgery, there is need to evaluate its relationship with other specialties in dental surgery and medicine as a whole. In the dental sphere, it is related to the orthodontics in the management of malocclusion, either by prevention or correction of the jaw deformities, to implantology and prosthetics. The specialty assists in the surgical preparation of the oral cavity for placement and better function of the prosthesis. Based on consultation with periodontics and conservative dentistry, oral and maxillofacial surgeons perform surgeries to treat gum and teeth diseases.

Many of our patients and even some of my colleagues may not be aware of the relationship between oral and maxillofacial surgery and the medical conditions. Indeed a strong relationship exists between the maxillofacial surgeon who deals with both the skin ''rubber'' and the bone and the plastic surgeon who deals with only the rubber part. A true relationship also exists between the general surgeon from whom all surgical specialties revolted my closest neighbours being the ophthlamologists and the otorhinolaryngologist as well as the orthopaedic surgeons, not forgetting the gynaecologist who works in the southern hemisphere in the tunnel but shares through divine arrangement the same epithelium with my main surgical field, the oral cavity. Similarly, I may not be able to perform any surgical procedure in the OR if I fail to recognise the 'marital' relationship between the maxillofacial surgeon and the 'almighty' anaesthesiologists with whom we struggle for the air space of the patients (Fig. 4).

Fig. 4. The close relationship between the anaesthesiologists and the maxillofacial surgeon as they struggle for airway.

In actual fact, with the exception of the OB Gyn and the anaesthesiologists, many specialties work in discrete surgical areas but often compete with one another. As each specialty justifies its existence the surgical boundaries become ill-defined but with collaboration from these same surgical specialties in the surgical arena of the face the post-operative results become fruitful and beneficial to the patient.

Just like the Biblical plaguing of the Land of Egypt in Exodus 7, the maxillofacial region may become plagued by various surgical diseases which are ignorantly attributed to punishment by 'a god' who is believed to be angry at them or the land. Such belief leads to initial resort to appease such local 'gods' or seeking intervention from the use of local herbal medications and charms. Neglect and ignorance of allopathic remedies result in turning the region of beauty and attraction to an area of trepid fear resembling that of a masquerade (Fig. 5).

Fig. 5. Various disfigurements as a result of maxillofacial diseases.

The scope of this specialty varies from country to country and also depending on the training and skill of the individual practitioner **(Ajike et al., 2004;** Adebayo, et al., 2008) (Tables 1). These 2 papers reviewed 87 and 86 patients from Kano and Port Harcourt respectively. Indications for maxillofacial interventions included tumours, cysts, traumatic conditions, congenital malformations and the presence of foreign bodies. The procedures performed were enucleation, excision and resection of tumours, closed reduction of fractures with maxilla-mandibular fixation, reconstructions and exploratory procedures. From my experience, trauma remains the most common cause of maxillofacial surgery. As for treatment, use of simple arch bars/eyelets is effective in the reduction and immobilization of jaw fractures. .

As an over view of the scope, Ajike et al in 2004, reviewed the spectrum of oral and maxillofacial surgical procedures seen between 2001 and 2003 in Aminu Kano Teaching Hospital, Kano. The indications for treatment in 87 patients were maxillofacial fractures and tumour ablation (Table 1). A total of 87 patients had 98 various surgical procedures (primary and secondary) (Table 2). The age range was from 3 days to 90 years with a gender distribution of 56 males and 31 females. The most common complication was malocclusion (n=14, 29.8%), facial defects and others (Table 3). Seven (58.3%) of the 12 facial defects were

observed following resection with disarticulation. The secondary surgical procedures were carried out to correct some of the complications (Table 2).

Table 1. Diagnosis/indications for surgery

Diagnosis	no	%
Odontogenic tumours		
Ameloblastoma	4	4.6
Amelobastic fibroma	1	1.2
Cysts		
Odontogenic keratocyst	1	1.2
Dentigerous cyst	1	1.2
Dermoid cyst	2	2.3
Frontal sinus cyst	1	1.2
Fibro-osseous lesion		
Ossifying fibroma	2	2.3
Fibrous dysplasia	1	1.2
Cementifying fibroma	1	1.2
Salivary gland tumours		
Pleomorphic adenoma (parotid)	5	5.7
Spindle cell carcinoma(submandibular gland)	1	1.2
Ectopic salivary gland	1	1.2
Non odontogenic tumour		
Osteosarcoma	1	1.2
Giant cell granuloma	1	1.2
Congenital		
Cleft lip and palate	8	9.2
Ankyloglosia	2	2.3
Trauma		
Mid third fracture	7	8.0
Mandibular fracture	24	27.6
Zygomatic complex fractures	5	5.7
NASAL COMPLEX fractures	1	1.2
Soft tissue injury/avulsion/laceration	9	10.3
Ectropion eyelid	1	1.2
Contracture	1	1.2
Osteomyelitis	2	2.3
Bilateral TMJ dislocation	1	1.2
Ankylosis	1	1.2
Collapsed anterior frntal bone	1	1.2
Foriegn body in the cheek	1	1.2

Total	87	100%

Source: Ajike et al. West Indian Med J **2004**; 53: 9-12.

Table 2. Primary and secondary surgical procedures

Surgical procedures	No	%
Enucleation	2	2.2
Resection with disarticulation	7	7.7
Repair	8	8.8
Excision	6	6.6
Surgical shaving	1	1.1
Release of contracture	1	1.1
Reduction and immobilization	21	23.3
Suturing	7	7.7
Debridement	3	3.3
Parotidectomy	5	5.5
Transoseous wiring	12	13.3
Percutaneous approach	2	2.2
sequestrectomy	2	2.2
Release of ectropion and skin grafting	4	4.4
Coronoidectomy	1	1.1
Acrylic cap splint	2	2.2
Release of ankyloglosia	1	1.1
Onlay graft (alloplastic)	1	1.1
Removal of foreign	1	1.1
C-shaped ostectomy	1	1.1
Inverted L-shaped osteotomy	1	1.1
Bicoronal flap	1	1.1
Total	90	100.0

Indications	secondary surgical procedures	No	%
Loss of mandibular Segments	autogenous iliac bone crest graft	1	12.5
Loss of mandibular Segments	insertion of Steinmann's pin	1	12.5
Wound breakdown	secondary suturing	1	12.5
Wound breakdown	skin grafting	1	12.5
Malunion with Aperthognathia	refracture with transosseous wiring	1	12.5
Oronasal fistula	repair	1	12.5
Parotid duct fistula	cannulation and repair	1	12.5

Total	8	100

Source: Ajike et al. West Indian Med J **2004**; 53: 9-12.

Table 3. Post-operative complication

Complications	**No**	**%**
Facial nerve weakness/paralysis	3	6.4
Parotid fistula	2	4.3
Oronasal fistula	1	2.1
Wound break down	2	4.3
Malunion	1	2.1
Post traumatic headache	2	4.3
Trauma (burns) to lip from surgical drill	1	2.1
Drooling of saliva	4	8.5
Speech difficulty	3	6.4
Immobility of tongue	2	4.3
Facial defect	12	25.5
Malocclusion	14	29.8
Total	47	100.0

Source: Ajike et al. West Indian Med J **2004**; 53: 9-12.

The paper concluded that trauma was the most common and use of simple arch bars was effective in the reduction and immobilization of the fractures. Reconstructive surgeries of ablated jaws were advocated in view of the aesthetic and psychosocial effects that they have on the patients.

Developmental anomalies of the oral and maxillofacial region

Developmental anomalies are defects that occur as a result of alterations to the normal development and growth of a body structures. They may manifest at birth (congenital) or appear later in life. Several terms are used to describe congenital abnormalities e.g. birth defects, congenital malformation, congenital anomalies, congenital disorders. Congenital anomalies can be defined as structural or functional anomalies, including metabolic disorders, which are present at the time of birth (WHO, 2014).

Developmental diseases result from different factors; some diseases are transmissible from parents to offspring (hereditary) (Fig. 6) (Ogunrinde et al., 2012), while others are caused by environmental changes (aquired).

Fig. 6. Hereditary ectodermal dysplasia. The patient would need ophthalmologist, implantologist prosthodontist, physician.

According to the Centre for disease control and prevention, most birth defects are believed to be caused by a complex mix of factors including genetic, environmental, and behavioural though many birth defects have no known cause. Teratogens are agents believed to cause developmental alterations such as chemicals, infections, and irradiations (Dixon et al., 2011; Knapp et al., 2012). These induce alterations only if exposure takes place at a time when the embryo is sensitive to its effect at a critical stage of intrauterine development.

Birth defect is a widely used term for a congenital malformation, i.e. a congenital, physical anomaly which is recognizable at birth, and which is significant enough to be considered a problem. Apart from the talipes (club foot) deformity, the next common birth defects occur in the maxillofacial region- cleft lip and /or palate.

The optimal time to seek surgical treatment for repair of face defects is before one year of age since the bones are still very soft and easy to work on. However, surgical intervention may be necessary at a much earlier age depending on the severity of

craniofacial deformity (Fig. 7). These days various techniques are available to detect congenital anomalies in foetus before birth and some attempts have also been made to surgically correct a few anomalies in-utero.

Fig. 7. Pre and post- operative teratoma in a neonate.

The most common types of craniofacial anomalies encountered include cleft lip and/or cleft palate, facial clefting, nonsyndromic and syndromic craniofacial syndromes. According to Egbe et al. (2014), non syndromic craniofacial defects account for about 10% of all non syndromic defects. In our environment (Zaria) occurrence of facial defects have been reported by Ajike et al.(2006; 2008) and Ibrahim et al. (2012) (Figs 8).

Fig. 8. Diprosopus (double face)

Source: Ibrahim et al. Nig J Plast Surg **2012**; 8(2): 57-60.

Of these, cleft lip and palate is the most common craniofacial malformations (Eshete et al., 2011) and the causeof several esthetic and functional implications that require rehabilitation (Freitas et al., 2012). The isolated or non-syndromic cleft lip and palate is the most common among the congenital malformations, affecting 1 in every 700 live births (Dixon et al., 2011), even though, there is variation related to the geographic location and socioeconomic conditions (Jia et al., 2009; Slayton et al). Prevalence of cleft lip and or palate is also a variable according to ethnicity, being higher in individuals of Asian descent (1 in every 440 births), followed by Caucasoids (1 in every 650 births) and Blacks (1 in every 2 thousand births) (Freitas et al., 2012). The deformity causes severe aesthetic and functional implications that require rehabilitation **(Fig 9).**

Fig. 9. Cleft lip and palate

Cleft lip may be unilateral or bilateral while cleft palate may be complete, with extension into the nasal cavity, or submucosal,

with a preserved palatal mucosa. Isolated cleft palates may be associated with syndromes such as Pierre-Marie-Robin sequence, Stickler syndrome, Treacher-Collins syndrome, Apert syndrome, 22q11 anomalies, and many others.

Patients usually present with aesthetic defects, difficulty in feeding, breathing and speaking, with occasional middle ear infection (Yi et al., 1999; Rajabian et al., 2000; Sanu and Ajike, 2003). Treatment protocol varies depending on the geographical location but always the treatment is surgical. In this environment it is approximately 3 months of age or the rule of 10s for the lip and between 9 and 12 months for the palate. Subsequently, the patient is followed up in the dental and maxillofacial clinics to correct any dental and maxillofacial discrepancies. In the rare clefts (Fig. 10) a ready protocol is not available.

Fig.10. Rare clefts of the orofacial region.

All patients with facial clefts post operatively have inherent defects in the facial architecture with different morphological characteristics and the involvement of several different types of structures, often impairing the oral cavity, nose and orbit (Fig. 10).

In a three year retrospective study (2008-2010) by Ajike et al. (2013) under the auspices of the smile train organisation, 79 (14.4%) of 550 patients were adult patients with clefts, age range of 17 to 81 years; mean 31.45 ± 13.09. Majority were between 20 and 39 years. There were 54 (68.4%) males and 25 (31.6%) females, with the male: female ratio of 2.2:1. Analysis of the cleft types/site revealed 35 (44.3%) lip alone, 22 (27.8%) lip and alveolus, 7 (8.9%) lip and palate and 15 (19%) palate alone. Seven (8.9%) of the

patients had other relatives with clefts. Sources of information were friends and relatives; 33 (41.8%), radio; 18(22.8%), charity organization/NGO; 13 (16.5%), hospitals/physicians; 5 (6.3%), and others; 10 (12.7%). 57 patients with lip clefts had surgery under local anesthesia while the remaining 22 patients were done under general anesthesia.

All clefts of the lip were repaired using the Millard advancement rotational flap for complete cleft, simple straight line closure for incomplete and double layer closure for the palate.

It was concluded that the incidence of adult patients with orofacial cleft is not rare in our community, probably due to limited access to specialized health care facilities, poverty and ignorance. Furthermore, some of the patients were not aware that their facial defects could be repaired. The advent of the smile train organization and free services has resulted in this harvesting phenomenon.

Cysts of the jaws

A cyst is a pathological cavity having fluids, semifluid or gaseous content which is not created by the accumulation of pus lined by an epithelium (Kramer, 1974; Shear, 1976). Cysts are neither limited to the jaw bones nor to the humans alone; their occurrences in domestic animals and lower primate have been reported. It is the most common cause of swellings of the jaws probably because of the numerous epithelial rest cells found in the jawbones.

The aetiopathogenesis of cysts is complex but could be divided into three parts: epithelial proliferation, cyst enlargement and bone resorption (Toller, 1967; Main 1970; Toller, 1996).

Cysts are more common in the mandible than in the maxilla although some varieties are traditionally localised to the maxillary bone. The maxillary lesions frequently extend to involve the orbital and nasal floors, zygomatic bone/arch, maxillary antrum and the cranial base. They clinically present as insidious growing swelling or occasionally as incidental finding during routine examination. Radiologically, cysts present as well defined radiolucent margins though not diagnostic as other lesions may masquerade as such (Ajike, 1995; Ajike et al., 2004; 2004b; 2007). Aspiration of straw coloured, bright yellow or blood stained fluid is suggestive of a cyst. The main stay of treatment is surgery (Ajike, 1995).

In the analysis by Ajike (1995) of the cystic lesions of the jaws: a prospective analysis of patients seen at the Maxillofacial Unit, ABUTH Kaduna reported 62 cases of which the most common was the cystic ameloblastoma; 41.9% , followed by the dentigerous cyst and the radicular cysts; 21% and 16% respectively (Table 4). The aim of the study was to analyse the serum protein and cholesterol content of cysts.

Table 4. Incidence of coded cysts types in 61 patients.

Cysts types	no of cysts	%
Odontogenic cysts	**11**	**48**
Radicular cyst*	10	16.1
Residual cyst	1	1.6
Odontogenic keratocyst	6	9.7
Dentigerous cyst	13	21.0
Cystic neoplasm	**26**	**41.9**
Ameloblastoma	26	41.9
Non- odontogenic	**5**	**8.1**
Nasoplatine cyst	4	6.5
Nasolabial cyst	1	1.6
Pseudocysts	1	1.6
Haemorrhagic bone cyst	1	1.6
Total	**62**	**100**

*One patient presented with a bilateral radicular cyst.
Source: Ajike. Dissertation for W Afr Coll Surgeons.

There was a predominance of males; 41(67.2%) to 20(32.8%) and a male female ratio of 2.05:1. All the coded cyst types showed a male predominance (Table 5).

The study concluded that young adults are commonly affected with the disease in the age range of 6 to 90 years with an average of 25.95 years (Table 6). The mandible was more involved than the maxilla with an average duration of symptoms of 3 to 15yrs. Aspiration from a cystic fluid though diagnostic but not specific. The color and consistency of the aspirates were highly

variable. The protein content distinguishes between the non-keratinizing and keratinizing cysts. For differential diagnosis of cyst types, the color, consistency of composition of the aspiration must be related to the clinical radiographic and histopathology features.

Table 5. The sex distribution of various cyst types in 61 patients.

Cyst types	Male	Female	Male : Female
Radicular cyst	7	2	3.5:1
Residual cyst	1	-	-
Dentigerous cyst	8	5	1.6:1
Odontogenic keratocyst	4	2	2:1
Ameloblastoma	18	8	2.25:1
Nasopalatine cyst	2	2	1:1
Nasolabial cyst	1	-	-
Haemorhagic bone cyst	-	1	-
Total	**41**	**20**	**2.05:1**

Source: Ajike. Dissertation for W Afr coll Surgeons.

Table 6. Age distribution of 61 patients with respect to various cystic types.

AGE RANGE	ODONTOGENIC					HAEMORHAGIC	
In Years	Radicular	Residual	Dentigerous	Keratocyst	Ameloblastoma	Nasopalatine	Nasolabial	Bone Cyst
0-9				1		1		
10-19	6			8	1	4	1	
20-29	1			4	2	10	2	1
30-39	1			1	2	6	1	1
40-49	1					3		
50-59					1			
60-69						1		
70>						1		

Source: Ajike. Dissertation for W Afr coll Surgeons.

In another retrospective study, Ajike et al., 2007 reported 18 (1.7%) frontal mucoceles (frontal sinus cysts) of 1167 maxillofacial patients seen between 1997 and 2005. There were seven males and 11 females, with a male female ratio of 1:1.6. The age range was from 19 to 65 years with a mean of 41.2 ± 13 and a median of 40.17.

94.4% presented with superonasal swellings; 12(66.7%) with proptosis; 6(33.3%) with diplopia; 12 (66.7%) with epiphoral and 2(11.1%) with loss of vision (Fig. 11).

Fig. 11. Frontocele

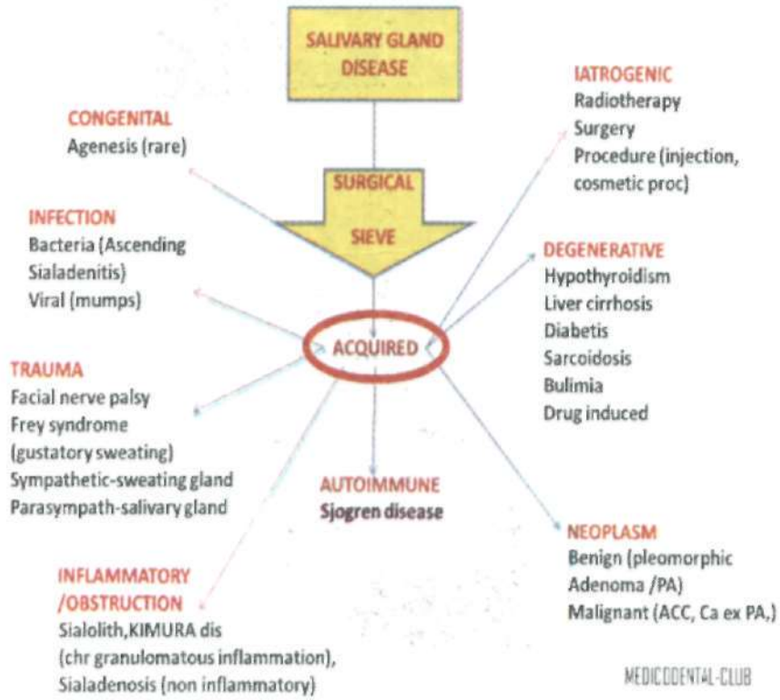
Plain radiograph shows opacification of the frontal sinuses with erosion of the medial walls in in 13(72%) cases. CT scan of 8 patients showed well defined hypodense homogenous frontal sinus and the orbit (Fig. 11). All the eighteen patients had enucleation via a bicoronal approach with frontonasal drain for three weeks for the re-establihment of normal drainage. Contents of the cysts were mucopurulent in 8(44.4%) cases Cheese-like in 6(33.3%) and mucoid in 4(22.2%) cases. Excellent aesthetic results were achieved and no recurrence was observed. The study advocated early

diagnosis and prompt surgical intervention of the lesions, complete surgical extirpation via a bicoronal flap for the grotesque swellings.

Salivary gland diseases

The conditions range from tumours, inflammatory disorders of infectious, granulomatous, or autoimmune etiology to obstructive, developmental, and idiopathic disorders. Fig 12 shows the schematic presentation of salivary gland diseases.

Fig. 12. Schematic representation of salivary gland diseases.



Salivary glands tumours make up 6% of all head and neck tumors and most commonly appear in the sixth decade of life. Most salivary gland tumors arise in the parotid and submandibular glands, and fewer than 10% of tumors arise in the minor salivary glands (Fig. 13). The classification of salivary gland disease in children and adolescents by Ajike and Lakhoo (2009) is shown in table 7.

Table 7. CLASSIFICATION OF SALIVARY GLAND DISEASES IN CHILDREN

1. **Non Neoplastic**
   1. Congenital / developmental
      Agenesis/aplasia/ hypo-genesis./hypoplasia
      Aberrant/ectopic
      Haemangioma
      Lympangioma

   2.Inflammatory and Infection.
   i. Viral

   Acute sialadentis

   -Mumps, CMV, Coxasackie A or B or Parainfluenza virus)

   -HIV associated salivary glands
   ii. Recurrent Parotitis in Children (RPC)

   3. Non-inflammatory
   i. Autoimmune
   Sjogrens syndrome

   4.Cysts:
   i. Ranula
   ii. Mucocele (mucous retention cyst.)

   5. Salivary gland dysfunction
   i. Xerostomia
   ii. Ptyalism/ sialorrhea

2. **Neoplastic tumours**

Salivary gland tumors

A. Benign
   (i) Pleomorphic adenoma
   (ii) Warthins tumour

B. Malignant
   Muco-epidermoid carcinoma
   Acinic cell carcinoma
   adenoid cystic carcinoma

Mesenchymal tumours	
	Neural tissue
	Neurofibroma
	Muscular tissue
	Rhbdomyosarcoma

Source: Ajike and Lakhoo. Paediatric surgery: A comprehensive text for Africa.

Typical features are hard or firm or fluctuant, painless, slow growing, freely mobile, bossellated mass. Facial nerve paralysis and ulceration in association with pleomorphic adenoma never occurs even in large grotesque swellings seen in Africans except in malignant transformation (Fig 14).

Fig. 13. Parotid, Submandibular tumours

Fig 14. Malignant parotid.

The most common intraoral site is the palate, followed by the buccal mucosa and the lip (Fig.15). While in the minor salivary glands, the features include bossellated ulcerated swelling, ill-fitting dentures and difficulty in speech which may occasionally erode the palatine bone, ulceration is usually as result of trauma or following topical application of herbal medication (Ajike et al., 2003).

Fig 15. Palatal pleomorphic adenoma pre and post-op.

Salivary gland tumours in children have the same clinical and biologic behaviour as in adults. A detailed clinical history with imaging features will narrow the differential diagnosis while providing useful information for management and prognosis. Incisional biopsy must be avoided because of tumour spillage and facial nerve damage. (Ajike and Lakhoo, 2009)

Diagnosis is made through fine-needle aspiration biopsy, and the primary treatment is surgical. The treatment of salivary gland diseases is categorized into two: medical and surgical depending on the nature of the disease condition. The neoplastic lesions usually require surgical intervention with or without radiation and chemotherapy, while the non neoplastic/ inflammatory diseases are managed symptomatically and conservatively (Ajike and Lakhoo, 2009).

In 2003, Ajike et al. reported 67 cases of minor salivary gland tumours with the objective of determining the clinical presentation and management of minor salivary gland tumours seen at the Ahmadu Bello University Teaching Hospital Kaduna, Nigeria during a 15-year period. *There were 35(52.2%) benign and 32(47.8%) malignant tumours (Table 8).* Of the 35 patients with benign tumours 32(91.4%) were pleomorphic adenoma while the remaining 3 were monomorphic adenoma. There was no apparent sex predilection with a male (34) and female 33, a ratio of 1.03 to 1. The most common site was the palate (n= 51, 76.1%). 70.15% were in the 3rd to 5th decades of life. The overall duration ranged from 2 weeks to 192 months (mean; 13.6 months, median; 12 months). The signs and symptoms varied from slow growing swelling, nodular,

smooth, soft fluctuant fixed or mobile with ulceration and bleeding (Table 9). 44 cases (81.82%) had surgical treatment while the remaining 11 patients had radiotherapy and one had radiotherapy and chemotherapy. Follow up period was from 1 to 15 years with an overall recurrence rate of 4.48%. This study concluded that minor salivary gland tumours are rare. The outcome of surgery was dependent on the surgical philosophy of wide circumscribing excisions of about 3-5mm margin.

Table 8. Histopathologic classification of 67 minor salivary gland tumors

Classification	No (%)
Benign Tumors	35
Pleomorphic adenoma	32(47.8)
Monomorphic adenoma	3(4.5)
Malignant Tumors	32
Adenoid cystic carcinoma	19(28.4)
Adenocarcinoma	8(12)
Muco-epidermoid carcinoma	4(6)
Malignant pleomorphic adenoma	1(1.5)
Total	*67(100)*

Source: Ajike et al. Nig J Surg Research 2003; 5: 100-105.

Table 9. Signs and symptoms of 67 minor salivary gland tumors.

Signs	Benign		Malignant		
	Pleomorphic adenoma	Monomorphic adenoma	Mucoepidermoid tumor	Adeno-carcinoma	Adenoid cystic carcinoma	Malignant pleomorphic
Painless swelling	23	1		2		
Painful swelling	3	2		15	6	
Slow swelling	25	3	2	2	1	
Rapid growing	-	-	1	8	3	1
Smooth	6	1	2	-	1	-
Nodular	9	-	-	1	1	-
Soft	9	-	-	5	-	-
Firm	21	3	-	5	5	-
Fluctuant cystic	6	-	-	2	-	-
Fixed	-	1	2	3	4	1
Mobile	3	-	1	-	1	-
Ulceration	6	-	3	13	6	1
Bleeding	1	-	-	5	4	1
Metastatic	-	-	-	4	2	-

NB. A single case often had multiple signs and symptoms and not all the features were recorded for each tumour.

Source: Ajike et al. Nig J Surg Research 2003; 5: 100-105.

The summary of this was that minor salivary gland tumours are rare. Late presentation was the reason for the large swellings and ulcerations. The modalities of treatment were surgery ± chemoradiation and for low recurrence radical surgery is advocated.

Maxillofacial trauma

This constitutes a high percentage of all daily traumatic admissions in the surgical wards (Thaller and Beal, 1991) and form the bulk of the surgical procedures in some maxillofacial centres. The mid face is divided into upper and lower parts. The upper mid face is made up by the zygoma, nasal bones, ethmoid bone, and non-tooth–bearing segment of the maxillary bone which is where maxillary LeFort II and LeFort III fractures occur and/or where fractures of the nasal bones, nasoethmoidal complex (NOE) or zygomaticomaxillary complex (ZMC), and the orbital floor occur and The lower midface is composed of the maxillary alveolus, teeth, and the palate and is where LeFort I fractures occur (Fasola et al., 2003; Owoeye et al., 2013) (Fig 16). The lower face is composed of the mandible where fractures can occur (Anyanechi et al., 2011)

Fig 16. Naso-ethmoido-fronto-orbital fracture.

Injuries to the face, by their very nature, impart a high degree of emotional and physical trauma on patients. Typically, facial injuries are classified as either soft tissue injuries (skin and gums) (laceration), bony injuries (fractures) (Fig. 17) (Fasola et al., 2000; Abbas et al., 2013), or injuries to special regions (such as the eyes, facial nerves or the salivary glands) (Kamath et al., 2012; Ajike et

al., 2011). More than 50% of patients with such injuries have multisystem trauma that requires coordinated management between emergency physicians and surgical specialists in oral and maxillofacial surgery, otolaryngology, plastic surgery, ophthalmology, and trauma surgery (Ajike et al., 2005). Age ranges mostly between 21and 30 years, with a male preponderance (Gandhi et al., 2011).

Fig. 17. Soft and hard tissue injuries.

Majority occur in the mandible (Bali et al., 2013). The aetiology of maxillofacial injuries varies from country to country, even regionally and is influenced by social, cultural, seasonal and environmental factors (Ugboko et al., 2002a; Fasola et al., 2003; Kruger et al, 2006). The main causes of injury were road traffic accidents and interpersonal violence (Ajike et al., 2005; Anyanechi et al., 2011) with involvement of two-wheeled vehicles (Oginni et al. 2009). In socio-economically advanced countries, drugs and alcohol are often associated with interpersonal violence in causing facial injuries.

In an ascending order the clinical presentation of LeFort I fractures include facial edema and mobility of the hard palate and maxillary alveolus and teeth, LeFort II fractures include facial edema, telecanthus, subconjunctival hemorrhage, mobility of the maxilla at the nasofrontal suture, epistaxis, and possible CSF rhinorrhea while LeFort III fractures include massive edema with facial rounding/ballooning, elongation, and flattening (Fig 18).

Fig 18. Fracture of the maxillofacial skeleton.

An anterior open bite may be present due to posterior and inferior displacement of the midfacial skeleton. Movement of all facial bones in relation to the cranial base with manipulation of the teeth and hard palate, epistaxis, and CSF rhinorrhea may also be found upon physical examination (fig. 18).

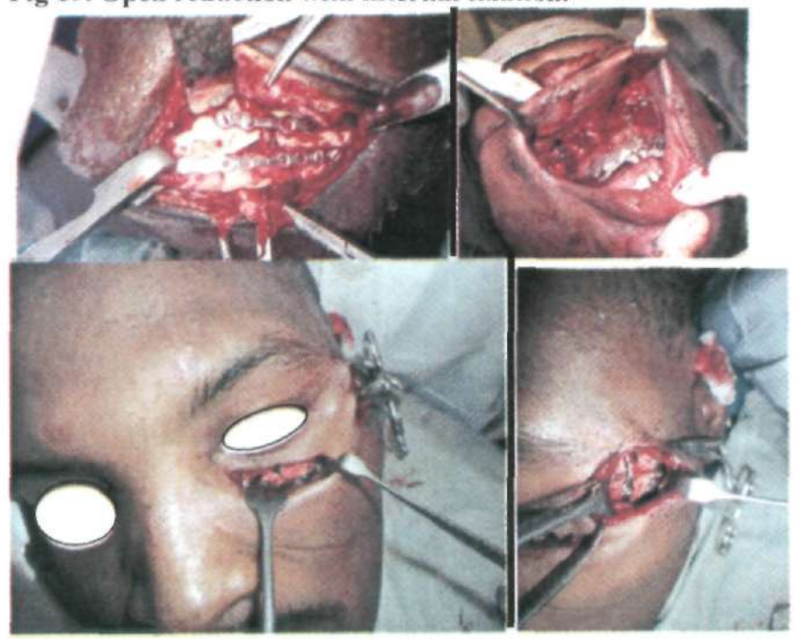
Common findings of mandibular fractures include painful jaw movement and malocclusion of the teeth and an inability to open the mouth or bite down hard. Mobility and crepitus can be palpated along the symphysis, angles, or body.

Intraoral edema, ecchymosis, gingival bleeding, or tears may be present. An anterior open bite can occur with bilateral condylar or angle fractures. Disruption of the inferior alveolar nerve, including the mental branch, may cause paresthesia or anesthesia of half of the lower lip, chin, teeth and gingiva when the fracture involves the mandibular angle, body, or parasymphysis.

Condylar fractures are the most often overlooked. The area anterior to the meatus of the ear is tender to palpation. The condyle on the fractured side does not move when the mandible is opened and closed.

The main stay of treatment of maxillofacial fractures is reduction and immobilization which could be achieved either by close or open reduction and internal fixation (Fig 19).

Fig 19. Open reduction with internal fixation.



The relatively recent development and use of "rigid fixation" has profoundly improved the recovery period for many patients, allowing them to return to normal function more quickly.

Complications may include aspiration, airway compromise, scars, permanent facial deformity secondary to improper treatment nerve damage resulting in loss of sensation, facial movement, smell, taste, or vision, infection, malnutrition, weight loss, nonunion or malunion of fractures, malocclusion, hemorrhage.

In 2005, my colleagues and I in an epidemiological survey of maxillofacial fractures and concomitant injuries in Kaduna, Nigeria reported 820 fractures of the maxillofacial skeleton and 70 concomitant injuries from 543 patients. Road traffic crashes (50.8%) were the most common aetiologic factor followed by falls (20.3%) and fights (18.8%). The age range was from 3.5 years to 67 years (mean =39.7) and a peak incidence in the 4th decade (n=197, 36.3%) with a male –female ratio of 3.7:1 (Table 10). The most common location was the mandible 615 (75%) and middle third 205(25%) (Table 11).

Table 10. Age and sex distribution of maxillofacial fractures.

Age	Sex		Total(%)
	Male	Female	
0-10	9	4	13(2.4)
11-20	45	17	62(11.4)
21-30	123	25	148(27.3)
31-40	157	40	197(36.3)
41-50	64	22	86(5.8)
51-60	19	4	23(4.2)
61-70	11	3	14(2.6)
Total	**428**	**115**	**543(100)**

Source: Ajike eta al. Nig J Surg Research **2005**:7: 3-4.

There were 316 (58.2%) isolated mandibular fractures, 124(22.8%) isolated middle third fractures and 65 (12%) combined mandibular and middle third fractures. Majority of the patients were treated by closed reduction. Concomitant injuries were 8.5% with orthopaedic injuries accounting for the majority (67.1%) (Table 12). The study concluded that maxillofacial injuries were on the increase and advocated for the establishment of regionalized trauma centres. To reduce the number of injuries, there is need for better road safety laws with stringent enforcement particularly for those between 15 and 45 years of age who should be educated about road safety laws.

Table 11. Anatomic distribution of maxillofacial fractures.

Location	No of fractures (%)
Mandible	
Symphysis	56(9.1)
Body	164(26.7)
Angle	145(23.6)
Condyle	40(6.5)
Ramus	121(19.6)
Dento-alveolar	89(14.5)
Total	**615(100)**

Types	
Unilateral	380(61.8)
Bilateral	137(22.3)
Multiple	98(15.9)
Total	**615(100)**

Mid face	
Dento-alveolar	11(5.4)
Lefort I	22(10.70)
Lefort II	54(26.3)
Lefort III	8(3.9)
Zygomatic	86(42.0)
Fronto-naso-ethmodial	18(8.7)
Palatal split	6(3.0)
Total	**205(100)**

Source: Ajike et al. Nig J Surg Research **2005**:7: 3-4.

Table 12. Concomitant injuries with maxillofacial fractures.

Type of injury	**No of patients (%)**
Cranio-Cerebral	11(15.7)
Orthopaedic limb fracture	41(58.5)
Pelvic fracture	4(5.7)
Clavicular fracture	2(2.9)
Pulmonary injury	6(8.6)
Ocular Injury	4(5.7)
Abdominal injury	4(5.7)
Total	**70(100)**

NB. One patient had more than one injury

Source: Ajike et al. Nig J Surg Research **2005**:7: 3-4.

The study shows that the fractures of the facial skeleton is not restricted to any age or sex in the young adult males between age 30 and 40 years. Any facial bone can be fractured but in our

environment, mandibular fractures are predominant with RTA as the main cause. The high frequency of maxillofacial fractures due to RTA in our population highlights the need for environment regulations and the wearing of safety helmets by motorcyclists. Also there is the need for repair of bad roads and the resuscitation of the rail transport system as an alternative to road transport for man and goods. In view of the avoidable morbidity and mortality due to inadequate treatment, we advocated the establishment of regionalized, efficient and focused trauma centers in various parts of the country particularly for acute trauma.

Neoplasm of the jaws

A neoplasm is an abnormal growth of tissue, the growth of which exceeds and is uncoordinated with that of the normal tissues and persists in the same excessive manner after ceasation of the stimuli which evoked the change (Willis, 1952). Neoplasms of the jaws constitute the bulk of the work of the oral and maxillofacial surgeon. The aetiology of such tumours includes poor oral hygiene (Ajagbe and Daramola, 1978), viruses (especially Epstein Barr) (Lamey et al., 1982; Goldstein and Berstein, 1990; Otoh et al., 2009; Paquette et al., 2013), trauma and irritation (Foresberg, 1954; Shafer et al., 1983), alcohol (Oshodin, 1981) and congenital (Lucas, 1984). Classifications of the jaw tumors are cumbersome and complex because of the varied tissues in the maxillofacial region. Many classifications (Pindborg and Clausen, 1958; Lucas, 1984; WHO, 2005; Bhasker, 1963) exist in the literature, however, authors agree that they could be divided into two main groups: the odontogenic (tumours originating from tooth bearing tissues or their remnants) and the non odontogenic (tumours arising from other tissues in the orofacial region) tumours (Rafindadi and Ayuba, 2002; Arotiba et al., 2003). The incidence of tumours of the jaws varies widely from geographic locations and in different studies. For instance, the western literature favour carcinomas as the most common tumor and odontomas as the most common odntogenic tumour followed by ameloblastoma and the myxomas (Ochsenius et al., 2002; Ramous et al, 2014), whereas the Nigerian and Asian literatures favoured the amelobalstoma followed by myxoma, adenomatoid odontogenic tumours, (Lu et al.1998; Adebayo et al., 2002; 2005; Arotiba et al.,

2007), even though odontomes are rare in this environment (Ajike and Adekeye, 2000).

Symptoms of jaw neoplasm are swelling, pain, tenderness, and unexplained tooth mobility with extensions into contiguous structures. Some tumors are discovered on routine dental x-rays, whereas others are found on routine examinations of the oral cavity and teeth Ajike et al. (2000b; 2009).

Treatment depends on location and tumor type. Benign tumors may be observed and may not need surgical excision, although most tumors require resection with possible reconstruction (Adebayo et al. 2005; Arotiba et al., 2005).

In a retrospective analysis from Kano, Nigeria by my colleagues and I (Arotiba et al., 2003) there were 55 cases of orofacial tumours and tumour-like lesions of the jaws. Table 13. shows the histologic types and sex distribution of orofacial tuomors and tumour-like lesions.

Table 13: Histologic types and sex distribution of orofacial tumours and tumour-like lesions (Arotiba et al. 2003)

Histological type	Sex		Total
	Male	Female	
Odontogenic			
Benign			
Ameloblastoma	5	4	9
Fibromyxoma	1	0	1
Cem. Fibroma	0	1	1
Odontome	0	1	1
Malignant			
Ameloblastic carcinoma	1	0	1
Non-odontogenic			
Benign			
Osteoma	1	0	1
Central giant cell granuloma	0	1	1
Fibroma	0	1	1
Lipoma	0	1	1
Peripheral giant cell granuloma	0	2	2
Pyogenic granuloma	1	1	2
Haemangioma	1	3	4
Neurofibroma	1	0	1
Pigmented naevus	1	0	1
Fibrous dysplasia	1	0	1

Salivary gland			
Pleomorhic adenoma	2	0	2
Malignant			
Osteosarcoma	1	2	3
Burkitt's lymphoma	1	1	2
Dermatofibrosarcoma	1	0	1
Squamous cell carcinoma	8	4	12
adenosquamous cell carcinoma	1	0	1
malignant melanoma	1	0	1
basal cell carcinaoma	0	1	1
Salivary gland			
Mucoepidermoid carcinoma	1	2	3
Adenocystic carcinoma	1	1	2
Total	29 (52.7%)	26(47.3%)	55

Source: Arotiba et al. Nig J Surg Research 2003:5:134 – 139.

Three most common odontogenic tumours: ameloblastoma, myxoma and adenomatoid odontogenic tumour and the rare odontomes were reported by this lecturer (Ajike and Adekeye, 2000; Ajike et al., 2000a; 2002b; 2009). A closer look at the most common epithelial odontogenic tumour in our environment by Ajike et al. (2009) showed 350 cases of ameloblastoma seen between January 1997 and April 2007, a 10 year period from which there were only 21 (6%) cases in the maxilla.

Analysis of the maxillary ameloblastoma reported 13 (57.1%) males and 8 (42.9%) females; with a male female ratio of 1.6 to 1. The age at diagnosis ranged from 17 to 55 years (mean =38.14), majority 13 (66.4%) were in the 4th and 5th decades of life (Table 14). Duration of lesion ranged between 3months and 14 years (mean =4.3, median=3).

Table 14: Age and sex distribution of 21 patients with maxillary ameloblastoma

Age range	Sex		No(%)
	Male	Female	
0-9			
10-19	1	1	2(9.5)
20-29	3		3(14.3)
30-39	3	2	5(28.3)
40-49	7	1	8(38.1)
50-59	2	1	3(14.3)
TOTAL	**13**	**8**	**21(100)**

Source: Ajike et al. Nig Med J 2009; 50(2):47-51.

There were 18 (85.7%) unilateral and 3 (14.3%) bilateral cases, while 20 (95.2%) were posterior tumours and one (4.8%) anterior tumour. Three of the posterior tumours had crossed the midline (Fig. 20).

Fig20. Maxillary ameloblastoma crossing the midline

The clinical presentations varied greatly, but all the 21 cases had grotesque swellings (Fig 21). In terms of site, majority, 19 (90.5%) had antral involvement with two (9.5%) extending into the zygomatic bone, the temporal region and into the orbit with blindness respectively (Fig. 21).

Fig. 21. Ameloblastoma involving the maxilla, zygomatic bone and the temporal region.

There were involvements of nasal cavity in five (23.8%) and one (4.8%) case in the palate. Presenting complaints were teeth mobility in 12 (57.1%) cases, exfoliated teeth in 7 (33.3%), nasal swelling/obstruction in 5 (23.8%), ulceration of lesion in 9 (42.9),

proptosis in 3 (14.3%), occlusal furrow in 10 (47.6%), bleeding in 4 (19.0%) and epiphora in one (4.8%) case.

The histopathologic types and their gross/ biologic appearance are presented in table 15. Radiography showed multilocular radiolucency and opacification of the maxillary sinus in 20 (95.2%) and one (4.8%) unilocular radioluency. Radical treatment was the modality of treatment in 20 (95.2%) and one (4.8%) had enucleation (Table 16). There were two (18.2%) recurrences of 11 followed up cases and (9.5%) of total cases. All the patients had radical maxillary procedures table 20

Table 15: The histologic types and their gross appearance

Histopathologic types	**No**	**%**
Follicular	11	52.4
Follicular with squamous metaplasia	3	14.3
Plexiform	3	14.3
Acanthomatous	4	19.0
Total	21	100
Gross appearance		
Solid	18	85.7
Cystic	1	21
Solid-cystic	2	9.5
Total	21	100

Source: Ajike et al. Nig Med J 2009; 50(2):47-51.

Table 16: Treatment modalities of 21 patients

Treatment modalities	**No**
Total maxillectomy**	15
Bilateral maxillectomy	2
Palatoal vecolectomy	1
Subtotal maxillectomy**	2
Radical maxillectomy + excision of zygoma	1
Enucleation	1
Total	**22**

**1 patient had left total maxillectomy with right subtotal. *2 patients had orbital exenteration.
Source: Ajike et al. Nig Med J 2009; 50(2): 47-51.

The defects were reconstructed in 9 cases using acrylic obturators with satisfactory results. Follow-up up period of 8 of the patients was from 6months to 2 years with 1(7.1%) recurrence.

The study concluded that maxillary ameloblastoma is uncommon. The richly vascularised and cancellous maxillary bone facilitating extension into paranasal sinuses, orbital and cranial cavities make maxillary ameloblastoma very lethal. Radical surgery offers the best result, while rehabilitation postoperatively remains a challenge particularly in bilateral maxillectomized patients (Fig. 22). A lifelong time follow-up is advocated.

Fig 22: Bilateral maxillectomized patient.

Source: Ajike et al. Nig Med J 2009; 50(2): 47-51.

Regarding the myxoma, which is the second most common odontogenic tumour and most common mesenchymal tumour in our environment, my colleagues and I (2000a) analysed 27 cases representing 8.5% of all (318) odontogenic tumours seen from 1985 to 1995. There was a female preponderance, a female to male ratio of 2.4:1 with an age range of 11-77 years (mean 29.6) with peak in the 4th decade of life. The mean age for the females was 31.3 years and 25.8 years for the males. Presentations were with slow growing painless swellings of which 26 cases were firm in consistency with overlying pale mucosa while there was ulceration in one case. Duration of symptoms ranged from two months to 14 years (mean 2.3years). The average duration for males and females were 1.8 and 2.6 respectively. Ocular symptoms were blindness and proptosis, with extension into the ethmoidal sinuses in one case. Features related to teeth included; toothache (26), loosening (5), displacement (14) and exfoliation (13). There were 14 (52%) mandibular and 13

(48 %) maxillary tumours. Majority were in the premolar and molar regions (Table 17).

Table 17: Site distribution of 27 cases of myxoma of the jaws.

Site of myxoma	No (%)
Mandible	
Horizontal ramus(anterior segment)	1 (3.7)
Horizontal ramus (posterior segment)	7 (25.9)
Horizontal ramus (antereior & posterior segment)	3 (11.1)
Horizontal ramus (anterior & posterior segments) and the vertical ramus	1 (3.7)
Horizontal (posterior segment) and vertical ramus	2 (7.4)
Maxilla	
Anterior maxilla	2 (7.4)
Posterior maxilla	4(14.8)
Posterior maxilla and tuberosity	3 (11.1)
Anterior and posterior maxilla and tuberosity	2(7.4)
Posterior maxilla, zygoma and antrum	1(3.7)
Anterior and posterior maxilla, zygoma, antrum, ethmoid and nose	1(3.7%)
Total	**27(100)**

Source: Ajike et al. Nig J Surg Research 2000; 2(3-4): 123-125.

Of the 18 cases (10 mandibular and 8 maxillary) with available radiographs majority (63%) were multilocular radiolucency; 2 soap bubble, 2 tennis racket, 1 honey comb while the remaining five were simply described as multilocular. For the maxillary lesions six of the eight were radiopaque while the remaining 2 (premaxillary lesions were multilocular). 26 (96%) of the 27 patients had surgical intervention (Table 18).

Table 18: Surgical intervention for 26 myxoma of the jaw bones

Surgery	no (%)
Curettage	3
Excision (0.5mm from apparent normal bone)	9
Resection (1 cm of apparent normal bone margin)	5
Resection with disarticulation (2 hemi mandibulectomies and one subtotal mandibulectomy)	3
Excision of tumour with dento-alveolar segment and preservation of the lower border of the mandible	4
Maxillectomy	2
Total	**26(100)**

Source: Source: Ajike et al. Nig J Surg Research 2000; 2(3-4): 123-125.

Follow-up of the 26 cases for 13 years (mean 5 years) with a recurrent tumour (3.7%) of total cases and (3.8%) of operated cases 3 years postoperatively.

This study alluded to the rare nature of jaw myxoma and enucleation should be avoided. However, curettage with scarification of the cavity with acrylic bur may be used for small lesions in the anterior mandible especially where patient is educated and follow-up reviews are possible. Finally, a radical approach as seen in the study is more appropriate with regular follow-up.

Report of nine cases of adenomatoid odontogenic tumour, representing 2.8% of 318 odontogenic tumours during a 20-year period (1979-1989) by Ajike et al. (2000b) concurs with the rarity of this tumour in our environment. Table 19 demonstrates the summary of the nine cases seen.

Table 19: Summary of the nine cases of Adenomatoid *odontogenic tumors* seen at ABUTH, Kaduna, Nigeria, 1979-1998

Case No.	Age	Sex	Duration	Site	involved tooth	Radiological features	Clinical diagnosis	Treatment	Follow up
1	15	F	6 months	maxilla 123	5	unilocular radiolucency	Dentigerous cyst	Enucleation	6 years
2	1	F	3 months	maxilla (ant)	7	unilocular radiolucency	N/S	Enucleation	13 years
3	12	M	months	maxilla 2-6	3	unilocular radiolucency	AOT	Enucleation	6 months
4	38	M	3 months	mandible 4-1	3	mixed unilocular radiolucency	Fibro- osseous lesion	Excision	9 years
5	19	M	6 months	maxilla 1-5	4	unilocular radiolucency	Dentigerous cyst	Enucleation	10 years
6	15	F	6 months	maxilla 3-1	2	unilocular radiolucency	AOT	Enucleation	-
7	23	F	2 months	mandible 5-3	4	unilocular radiolucency dentigerous	Unicystic Ameloblastoma cyst	Resection	-
8	12	M	6 months	maxilla 4-8	5	unilocular radiolucency	Dentigerous cyst	Enucleation	3 years
9	7	M	9 months	maxilla	3	unilocular	AOT	Enucleation	6 years

Source: Ajike et al. W Afri J Otolaryngol. Head Neck Surg 2000; 3: 40-43.

A *case reported of an odontoma* by Ajike and Adekeye (2000) also attest to the rarity of the tumour entity in our environment.

Primary malignant tumours of the oral and maxillofacial region could be tumors of epithelial origin (carcinoma) , immune system, and tumors of mesenchymal origin (sarcoma) (Azadeh et al.,2008; Subhashraj et al., 2009), however, the most common are the carcinomas, sarcomas, and the lymphomas (Adebayo et al., 2005; Ajayi et al.,2007; Otoh et al., 200). Of these epithelial malignancies, squamous cell carcinomas (Fig. 23) are the most common, followed by mucoepidermoid and the adenoid cystic carcinoma (Lawoyin et al., 1997; Otoh et al. 2005). Predisposing factors include poor diet and oral hygiene, smoking, alcohol, kola nuts (Otoh et al 2005; Chidzonga 2006; Chitapanarux et al.2006).

Fig 23: Squamous cell carcinoma stage IV

It is a disease of the middle aged and above (Chidzonga, 2006; Azadeh et al., 2008), however, most recent reports now favour occurrence in younger populations (Llewellyn, 2001; Chitapanarux et al., 2006; O'Regan et al., 2006). However, O'Regan (2006) speculated that it is possible that the biology of squamous cell carcinoma of the head and neck in young people differs from that in older people, whereas Llewllyn et al. (2001) proposed a predisposition to genetic instability as a likely cause.

Majority of the patients present with the late stage (III and IV) (Ugboko et al. 2004; Otoh et al., 2005; Ribeiro et al., 2009) (Fig. 23). Carcinomas are more common in males than females (Chidzonga 2006; Azadeh et al., 2008; Ribeiro et al., 2009). Regarding the sites, maxillary antrum is the most common extra orally (Ugboko et al., 2004) while intraorally, the tongue is the most common site followed by the major salivary glands (Chidzongaet al, 2006; Azadeh et al., 2008). The treatment of oral and maxillofacial

carcinomas is surgery with or without chemotherapy and radiotherapy (Ugboko et al., 2004; Chitapanarux et al., 2006).

Socio economic status (SES) of oral and maxillofacial patients

Several reports have recorded a strong association between oral and maxillofacial diseases and the socio-economic status of patients (Adekeye and Ord RA, 1982; Hodbell et al., 2003; Olasoji et al, 2005; Omisakin et al., 2013). According to Hodbell et al. (2003), one of the puzzles of public health is why some populations are healthier than others. The socioeconomic factors (ignorance, illiteracy and poverty) of patients have a great influence on the survival and outcome of the maxillofacial surgical patients particularly the oral malignancies and cervicofacial infections (Agarwal et al., 2007).

It is very difficult to establish the economic status of Nigerians as they always believe it is none of your business. However, my colleagues and I were able to determine the social status (Table 20) of the patients in two separate studies (Ajike et al., 2004; Omisakin et al., 2013) according to the index of Oyedeji et al. of 1984.

Table 20: Socio economic status of oral and maxillofacial patients

Occupation	no	%
Professionals (Lawyers, doctors, engineers etc)	4	4.6
Artisans(barbers, tailors, mechanics, hairdressers, etc)	5	5.7
Trading	18	20.7
Small scale businessman	7	8.0
Teaching	3	3.4
Farming	11	12.6
Civil servants	101	1.5
Students	131	4.9
Labourers/ messangers/cooks	2	2.3
Drivers	6	6.9
Unemployed/housewife	8	9.2
Total	87	100

Source: Ajike et al. West Indian Med J

Many Nigerian studies (Lasisi et al., 2002; Olasoji et al., 2005; Omisakin et al., 2013) and this study agree that majority of the maxillofacial patients attending tertiary institutions were in the lower and intermediate socio-economic group. In actual fact cancrum oris is found mainly in the lower socioeconomic group (Adekeye and Ord, 1983). The socio-economic index of patients has a direct relationship with the disease and the outcome. From the Kano study (2004), only 2 of the 87 patients had reconstruction of the mandible following its ablation with iliac crest bone graft and Steinmann's pin. The two patients were in the high socioeconomic group.

Cervico facial abscesses and infections (multi- space infection)

For centuries, the diagnosis and treatment of cervico-oro facial infections have challenged physicians and surgeons. The complexity and the deep location of this region make diagnosis and treatment of infections in the area difficult. These infections remain an important health problem with significant risks of morbidity and mortality (Pourdanesh et al., 2013). Infection of the region may be due to bacterial, fungal or viral (Ugboko et al., 2002; Amanyeiwe-Adaka et al. 2004; Owotade et al., 2005). However, the most common are bacterial infections (Ndukwe et al., 2007).

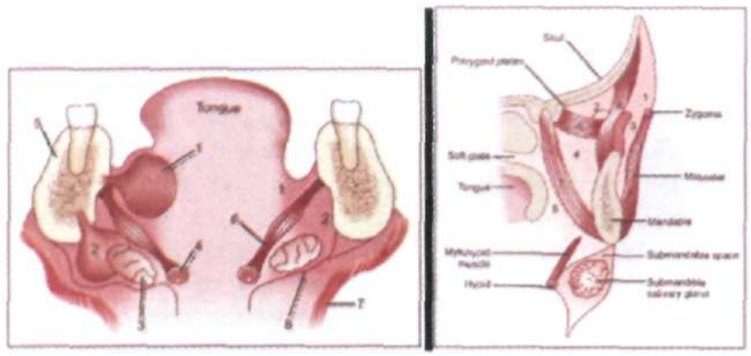
Orofacial infections may be odontogenic or non odontogenic in nature and majority of odontogenic infections are caused by the endogenous bacterial microbiota in the oral cavity (Dahlén, 2002) while non odontogenic infections vary depending on the nature and site of infection (Sandor et al., 1998). Today, odontogenic origin is the most common etiology in adults whereas tonsillitis remains the most common etiology of deep neck space infections in children (Ndukwe et al., 2007; Chang et al 2010; Conrad et al. 2012). Morbidity and mortality related to such infections depend on the site of involvement and the degree of spread to other tissues (Fig 24 and 25).

The age group is usually between 21 and 40 years (Kudiyirickal and Hollinshead, 2012) with no sex predilection (Gonçalves et al., 2013), although Akinbami et al. (2010), documental more males.

Most of the odontogenic infections originate from the mandibular region (Pourdanesh et al., 2013).

Pathophysiology of odontogenic infection: invasion of the dental pulp by bacterial, infection following dental caries of a tooth →Inflammation, edema and lack of collateral blood supply→ venous congestion or a vascular necrosis consequently leading to death of the pulp → reservoir for bacterial growth → the bacteria penetrate and spreading into the surrounding bone (osteomyelitis) and the soft tissues (cellulitis) (Fig25).

Fig 24: Spread of odontogenic infection.



Odontogenic infections are usually polymicrobial consisting of anaerobe, aerobes and mixed organisms(Bratton et al., 2002; Walia et al.,2014) of which the most common bacteria are Staphylococcus aureus, Klebsiella, E. Coli, Peptostreptococcus and the Fusobacteria (Rega et al., 2006; Akinbami et al, 2010).

An aspect of cervico-facial infections is cellulitis. This is inflammation of the connective tissues. It is characterized by brawny, board like diffuse swelling of the tissue spaces. The spaces involved are usually the submandibular, sublingual, submental, masseteric/ submasseteric, canine and infratemporal spaces (Fig. 25).

Fig. 25. Cellulitis involving submandibular, submental, sublingual, canine masseteric/submasseteric, temporal and infratemporal spaces

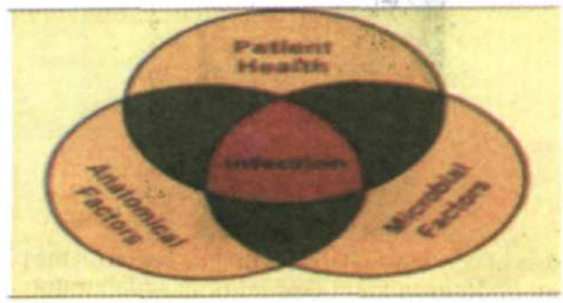
Diagnosis of cervico-facial infections is based on the patient's history, physical findings, imaging modalities and laboratory results (Bratton et al). However, multi space involvement is very often seen as in Ludwig's angina where the submandibular sublingual and the submental spaces are involved bilaterally (Fig 26).

Fig. 26. Ludwig's angina

It presents with diffuse swelling of the floor, protrusion of the tongue, difficulty in speech and breathing with trismus. Usually there is no pitting or induration. Patients appear toxic with systemic malaise and pyrexia. This type of cellulitis carries a high risk of morbidity and mortalilty (Gonclaves et al., 2013; Pourdanesh et al., 2013). The risk factors in cervico facial infections are: host factors (age above 45, presence of underlining diseases, immunity,

malnutrition, habits; smoking and drinking, dehydration), microganism and anatomical barriers. The interplay is shown in fig 27.

Fig 27. Interplay of host, anatomical and microbial factors in cervicofacial infection



In order to manage such infections scientifically, correct identification of the aetiology and pathology of the disease is important. Appropriate choice and duration of antimicrobial prescription for the infections rely upon the age, systemic infection and other co-morbidities of patients. Analysis of etiopathogenesis and presentations of orofacial infections, in a general dental practice would help to understand the clinical spectrum of such important illnesses and tailor the right treatment strategy for patients in future.

Basic treatment includes appropriate medication (sensitive antibiotics usually penicillins and flagyl), and surgical therapy (incision and drainage) (Bratton et al 2002; Rega et al., 2006; Goncalves et al., 2013). Multi space infections are usually drained extraorally. Establishment of airway before initiating any surgical procedure may be necessary in some forms of cellulites, particularly in Ludwig's angina.

Complications of cellulitis include Necrotizing fasciatis (flesh eating bacteria), mediastinitis, pleural effusion, Ludwig's angina, cavernous sinus thrombosis, osteomyelitis, cancrum oris (Fig. 28).

Fig. 28. Necrotizing fasciitis as a complication of cellulitis.

Disease of the temporo mandibular joints

The temporomandibular joint is a craniomandibular joint formed by the condylar process of the mandible and the glenoid fossa of the squamous temporal bone. It is a ginglymoarthroidal joint i.e. it has both hinge and sliding actions (Kapoor, 2011). The joint may be affected by a plethora of diseases: dislocation (Olaitan et al., 2001; Ugboko et al., 2005), congenital anomalies (Ajike et al., 2006; 2008), trauma (Ajike et al.,2011a), temporomandibular joint dysfunction/disorder (Wang et al, 2012), ankylosis (Ajike et al., 2005; 2011b; Bello et al., 2012), degenerative diseases (Wang et al., 2012) and occasionally by tumours and pseudotumours (Nwoku and Koch, 1974). Of these diseases, the most commonly encountered in our environment is the temporomandibular joint ankylosis which was analysed by Ajike and Omisakin in 2011 which included, 26 patients: 12 males and 14 females a ratio of 1.6:1 (Table 21) with 19 unilateral and seven bilateral joints giving a total of 33 joints ankylosis (Table 22) seen during a nine year period from January 2000 to December 2008..

Table 21: Aetiology and sex distribution of 26 patients with temporomandibular joint ankylosis

Aetiology	No (%)	Gender	
		Male	Female
Trauma	18(69.2)	10	8
Infection			
Otis media	2(7.7)		2
Cancrum oris	3.(11.5)	1	2
Unknown	2(7.7)	2	
Congential	1(3.9)	1	
Total	26(100)	12	14

Source: Ajike et al. West Indian Med J 2011; 60(2): 172-176.

Table 22: Features associated with temporomandibular joint ankylosis

Side of ankylosis	*No of patients*	*%*
Left	7	26.9
Right	12	46.2
Bilateral	7	26.9
Total	**26**	**100.0**
Type of ankylosis		
Bony	23	69.7
Fibro-osseous	8	24.2
Fibrous	2	6.1
Total	**33**	**100.0**
Stage of bony/fibrous-osseous ankylosis		
Ankylotic bone limited to condyle	16	51.6
Ankylotic bone extending to Sigmoid notch	3	9.7
Ankylotic bone extending to the Coronoid process And part of the arch	10	32.2
Ankylosis involving the maxilla and mandibular bones	2	6.5
Total	**31**	**100.0**

Source: Ajike et al. West Indian Med J 2011; 60(2): 172-176.

Anaesthesia was a great challenge, the mode of aesthesia of 25 patients were tracheostomy, blind nasal intubation and fibreoptic laryngoscopy. Treatment modality was surgery (Table 23). Gap arthroplasty was done in 20 joints while the remaining 11 joints had interposition arthroplasty. Interposition materials used were 7 pterygomasseteric slings, 3 auricular cartialage and 1 skin. Post–operatively: there 7 anterior open bites, 3 facial nerve weaknesses, 3 infections with 2 recurrences.

Table 23: Surgical procedures on 31 joints

Surgical procedure	Number
Bilateral condylectomy	4
Condylectomy +angle ostectomy	8
Condylectomy	4
Condylectomy + excision of bone in the sigmoid notch	3
Angle osectomy	10
Body osectomy +excision of fibrous band	2
Total	**31**

Source Ajike et al. West Indian Med J 2011; 60(2): 172-176.

I must quickly add here that, although quite a number of dislocations of the temporomandibular joint dislocations probably occur without their reports to the hospital because majority of them are acute and as such are easily reducible by the patients. However, the chronic types of dislocations are the ones often seen. This lecturer and his colleagues have documented similar cases (Olaitan et al., 2001; Ugboko et al., 2005) encountered in this geographic location.

Reconstruction

Surgical ablation of the jaws results in high morbidity with significant psychological and functional implications, some of which include difficulties in mastication, deglutition, speech and poor facial aesthesis. The resultant facial disfigurement may cause severe debilitating effects in the patients thus preventing normal societal social interaction which may be challenging to the oral and maxillofacial surgeon (Fig. 22).

Surgical reconstruction of maxillofacial defects require the provision of skin coverage (Fig. 29), establishment of the continuity of the face/jaws through bone grafts (Fig. 30) or alloplastic materials (Osunde et al., 20013), creation of buccal and lingual sulcus to provide a stable foundation for the in-coming prosthesis (Fig. 31) Furthermore, pre-prosthetic implants may be needed to improve retention and stability of facial prosthesis. Facial prosthesis may also be made and delivered with frames or occasionally attached with special gums to the area (Fig 32 and 33).

Fig 29: Reconstruction with skin coverage after excision of fibrosarcoma

Fig 30: Frontal facial defect with bone grafting

Fig 31: Mandibular ameloblastoma with full restoration of function, and aesthetics following mandibular reconstruction

Fig 32: Facial/ear prosthesis for part of lost ear.

Fig 33: Orbital prosthesis following traumatic extrusion of the left eye

The future human face

Mr Vice- Chancellor Sir, since I started with a question permit me to end with another question, which is just a pip into the future: How will the future human face look like?

The human face is constantly changing, although, very slowly. In prehistoric times, the face was more like that of an ape. The shape has also changed in present time to what it is now. What significant changes will be in human face, say after a million years from today????

Kwan and Lamm teamed up to imagine what the human face *may look like in 20,000, 60,000 and 100,000 years from now and they* hypothesized that it will feature larger fore-heads and massive eyes (Fig 34) with the bigger eyes helpful in low-lighting situations in space (Kwam, 2012). Lamm (2012) hypothesized that this change would result from genetic engineering and wearable computers (think Google Glass)

While some say this is pure fantasy, Mathew Herper of Forbes says that, " For what it is worth, I think Lamm's work is conceptually cool, but wanted to get on-the-record that this is dreaming, not science."

He went further to say "Our future selves will ultimately control human biology and human evolution the way we control the flow of electrons through our electronics today and that in this potential future, humankind has wrested the control of the human form from natural evolution and are able to bend human biology to human needs."

Fig 35: How we might look in 20,000 years to come **How we might look in 60,000 years to come** **How we might look in 100,000 years to come.**

Source: Human race in 100 thousand years: future of our faces.

Conclusion and Recommendations

Mr. Vice-Chancellor Sir, in the course of this lecture, I have elaborated on the contributions of oral and maxillofacial surgery, a branch of dental surgery and my humble contributions to knowledge. These have been done without the use of excessive medical and maxillofacial jargons.

In conclusion, I hereby recommend that:

1. The present Dental Surgery Department is transformed to the Faculty of Dental Surgery, under the College of Medicine, Ahmadu Bello University, Zaria. This is will be the first Dental Faculty in the middle belt.
2. Maxillofacial surgery being a highly technical and capital intensive field needs adequate funding. There is need for government to fund health care so that both healthcare workers and the patients have better services.
3. Since trauma constitutes the bulk of the work of the oral and maxillofacial surgeons, a regional trauma centre should be established in Zaria as part of the ABUTH. Furthermore, traffic rules need to be enforced to minimize road traffic crashes that are the main cause of facial injuries.
4. There is a need to sensitise the populace about oral and maxillofacial diseases by promoting oral health awareness and education.
5. There is the urgent need to include care of maxillofacial diseases among condition covered by the National Health Insurance Scheme to reduce the financial burden of healthcare on Nigerians especially as most patients in our public health facilities belong to the lower socio-economic groups.
6. There is a need for the establishment of a craniofacial team to comprise of pediatric maxillofacial surgeon, pediatric plastic surgeon with expertise in craniofacial deformities, neurosurgeon, pediatric dentist, orthodontist, speech therapist, otorhinolayngologist, ophthalmologist, audiologist, psychiatrist, social worker and genetic counselor.

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