Oral and Maxillofacial Surgery

The specialty of oral and maxillofacial surgery is unique in requiring a dual qualification in medicine and dentistry and is a recognised international specialty which within Europe is defined under the medical directives.

The scope of the specialty is extensive and includes the diagnosis and management of facial injuries, head and neck cancers, salivary gland diseases, facial disproportion, facial pain, temporo-mandibular joint (TMJ) disorders, impacted teeth, cysts and tumours of the jaws as well as numerous problems affecting the oral mucosa such as mouth ulcers and infections.

The British Association of Oral and Maxillofacial Surgeons (BAOMS) has produced specialty specific criteria, standards and evidence for the practice of oral and maxillofacial surgery in the UK.

The website can be found at www.baoms.org

History

The British Association of Oral Surgeons was formed in February 1962 by resolution of a Steering Committee under the Chairmanship of Norman Rowe. The inaugural meeting was held at the Royal College of Surgeons of England in April 1962. The first President, Terrence Ward, and the first Council were elected by the 75 founder members. The Honorary Secretary was Norman Rowe and the Honorary Editor, John Hovell, all three at the leading edge of the specialty internationally. Later that year the Presidential Badge of Office was presented by the sister American Association (American Association of Oral and Maxillofacial Surgeons - web site http://www.aaoms.org/).

Oral & Maxillofacial Surgery originated in this country as the surgical specialty of dentistry, developing from the need for specialist services to treat jaw injuries sustained by servicemen during the two world wars. It soon became clear that the prevalence of civilian facial injuries in peace time was at least as great, largely due to the increasing use of motor cars and motor cycles. The specialty of Oral & Maxillofacial Surgery evolved to meet the clear demand for treatment of an increasingly large range of pathological conditions of the face, jaws and teeth. The complexity of the specialty was reflected by a change of title from The British Association of Oral Surgeons to The British Association of Oral & Maxillofacial Surgeons in 1985/6.

As a hospital-based, surgical specialty it became logical that both dental and medical qualifications were required. Dual qualification became mandatory in the late 1980's. Likewise, the requirement of basic general surgical training, assessed by a surgical Fellowship examination, was developed in conjunction with the Royal Surgical Colleges. The specialty, whilst always retaining its dental base, was formally established as one of the nine surgical specialties in 1994 and has membership of the Senate of Surgery and its Committees.
The International Scene

Oral & Maxillofacial Surgery exists as a surgical specialty in most countries of the world. The specialty in the United Kingdom is structured and defined in harmony with other countries in the EEC to ensure that accredited specialists have the right to practice in other member states.

European Law highlights the difference between Oral & Maxillofacial Surgery and the other surgical specialties, a difference based on its unique association with dentistry. Oral & Maxillofacial Surgery (surgery of the mouth, jaws and face) is therefore defined under the Medical Directives as a specialty requiring both medical and dental qualification.

However, surgery of the mouth (oral surgery) has always been part of dentistry and remains defined as a dental specialty in the separate Dental Directives.

Training Requirements

The majority of Consultants in Oral & Maxillofacial Surgery in the United Kingdom qualified in dentistry before qualifying in medicine. The specialty is, however, open to trainees qualifying first in medicine and then obtaining a qualification in dentistry. An increasing number of trainees are following this route.

The majority of dental graduates will obtain an MFDS/MJDF before or during their medical training. However, an MFDS/MJDS is not a requirement for entry into specialist training.

The requirement for entry into specialist training (ST3 to ST7) is completion of core competencies and the MRCS examination. Specialist training is competency based but is usually a continuum lasting five years with an exit FRCS examination taken towards the completion of specialist training. This, together with successful RITA/ARCP outcomes, allows the Specialist Registrar to be awarded a Certificate of Completion of Training (CCT) in Oral & Maxillofacial Surgery and, therefore, be eligible for appointment as a Consultant in Oral & Maxillofacial Surgery, and with registration with the GMC and GDC appear in the specialist list in Oral & Maxillofacial Surgery held by the GMC.

Interface groups in relation to aesthetic, cleft lip and palate and head and neck surgery have developed competitive entry fellowships in these sub-specialty interests.

The Relationship of Oral and Maxillofacial Surgery with other Specialties

Oral & Maxillofacial (OMF) Surgeons have specific expertise relating to the mouth, jaws, face and neck; we diagnose and treat symptoms, pathology, deformity and trauma affecting these areas. As a result of treating diseases located in this anatomical region, OMF Surgeons can provide advice on multi-system pathology where this affects the head and neck. Furthermore, advice is provided for specialties such as clinical oncology to minimise and treat complications in the head and neck, following therapies provided by these other specialty groups. A large number of medical and dental specialties, therefore, have a strong relationship with Oral & Maxillofacial Surgery as follows:
Accident & Emergency - OMF Surgeons provide major support to all hospital A & E Departments, for soft and hard tissue injuries to the face, scalp and neck and for infections in this region.

Sport injuries - Clinicians specialising in sports injuries seek OMFS advice in relation to facial injuries sustained during sporting activities.

Neurosurgery & Neurosciences - OMF Surgeons collaborate on surgery for trauma, deformity and oncology, which straddles the face, skull and skull base. We are involved in the diagnosis of facial symptoms indicative of neural pathology. This is particularly important in the diagnosis and treatment of cervico-facial pain.

OMF Surgeons conduct facial disassembly procedures for intra-cranial and spinal access surgery and provide skull base reconstruction for neurosurgeons, fulfilling an important role in Craniofacial Surgical Units.

Ophthalmology - OMF Surgeons collaborate in the treatment of orbital trauma, oncology and deformity, and carry out orbital decompression in thyroid eye disease.

Dental Specialties - OMF Surgeons have a close relationship with orthodontists and restorative dental surgeons in relation to prosthetics, periodontal disease and advanced restorative procedures for dental implants. There is an important collaborative role in the preparation of oral oncology patients prior to, during and after radiotherapy. OMF Surgeons work closely with oral medicine consultants in the diagnosis and management of oral mucosal disease, and dental hygienists have an important role in Maxillofacial Units. OMF surgeons send tissue to oral pathologists who have specialist diagnostic skills in the orofacial region.

Dermatology - OMF Surgeons consult with dermatologists in the treatment of patients with vesicular bullous disease, oral mucosal disease and connective tissue disorders, such as systemic sclerosis, and provide an important surgical service for facial skin cancer.

Clinical Genetics - OMF Surgeons seek advice from geneticists for the families of children with severe facial deformity and other head and neck syndromes.

Clinical Oncology and Radiotherapy - OMF Surgeons have a leading role in the management of head and neck neoplasia, working as part of multi-disciplinary teams with a special relationship with oncology and radiotherapy. The specialty provides a surgical service in the diagnosis and management of these conditions and can advise and manage problems arising in the oral cavity in patients with other neoplasms, who become immuno-suppressed.

Anaesthetics - OMF Surgeons liaise closely with this specialty in patients with upper airway problems, and anaesthetists are a vital member of the team treating surgical disease in the oro-facial region, developing special expertise in this field.

Endocrinology - OMF Surgeons can provide a surgical service to reduce the size of prominent jaws in patients with acromegaly and Paget's disease and have the technical expertise to provide a surgical service for thyroid and para-thyroid disease.
Cardiology and Cardiothoracic Surgery - OMF Surgeons advise on the oral and dental status of patients with valvular heart disease and coronary heart disease.

Paediatrics - OMF Surgeons collaborate with paediatricians in the diagnosis and treatment of cervical and oro-facial infections and neoplasia, and provide treatment for neonates with craniofacial deformity, as part of the multi-disciplinary approach in cleft lip and palate and craniofacial units.

Orthopaedics - OMF Surgeons provide vital expertise in the combined treatment of trauma patients.

ENT - There is often a close relationship between OMF Surgeons and their ENT colleagues, with significant anatomical overlap in the areas of practice. The evolution of head and neck cancer teams with cross specialty (interface) fellowships has resulted in even closer working relationships to the benefit of patients.

Psychiatry - OMF Surgeons request psychiatric assessments on some patients, prior to facial deformity surgery, and collaborate in the management of patients with facial pain.

Rheumatology - OMF Surgeons collaborate in the management of patients with joint and connective tissue diseases, where they affect the temporomandibular joint, face and mouth. They also provide a surgical service for those patients with Sjögren's disease, who have problems or develop lymphoma in their salivary glands. They provide a diagnostic surgical service in suspected giant cell arteritis.

Intensive Care - OMF Surgeons are trained to provide a surgical tracheostomy service for those patients requiring prolonged endotracheal intubation.

Respiratory Medicine - OMF Surgeons liaise with respiratory physicians and orthodontists for the provision of intra-oral devices to control obstructive sleep apnoea and surgically enlarge micrognathic mandibles by conducting jaw osteotomies in a select group of these patients. They also provide a surgical service for neck node biopsy in suspected cases of tuberculosis, sarcoidosis, and other conditions. We seek advice from these specialties in our patients with compromised respiratory efficiency prior to their surgery.

Gastroenterology - OMF Surgeons often see patients whose first manifestation of a gastroenterological disease is in the mouth and liaise with gastroenterologists over the management of these patients. The specialties have a close relationship in the provision of percutaneous endoscopic gastrostomies (PEG) in major head and neck procedures.

Renal Medicine - Following immuno-suppression, renal transplant patients are at risk of skin and oral cancer. We help with the management of these patients where the disease affects the face and mouth.

Professions allied to Medicine - OMF Surgeons have close relationships with speech therapy, dieticians, physiotherapy, occupational therapy, audiology and other specialties allied to medicine in the management of a large range of patients requiring support and rehabilitation during and after treatment of conditions affecting the mouth, face, jaws and neck.
The above list is an indication of the important role that the specialty has in the management of a vast range of clinical conditions with individual consultants developing subspecialty interests within oral and maxillofacial surgery.

**The British Journal of Oral and Maxillofacial Surgery**

The Journal is published by Elsevier Limited ([Journal Web Page](#)) There are eight issues per year.

With support from editorial representatives in India and China, the Journal is flourishing in those countries. The aim of the Journal is to provide a leading edge scientific basis for the full spectrum of the specialty to stimulate further research, and to appeal to colleagues in ENT, plastic surgery, ophthalmology, dermatology, neurosurgery and other specialties.

The British Journal continues to receive excellent manuscripts and the standard is improving yearly. The impact factor of the Journal has been increasing year on year, maintaining its position as a leading maxillofacial journal.

**Research in Oral and Maxillofacial Surgery**

Research has an essential role in the development of any industry and health is no exception. Apart from allowing medical horizons to be widened, health economists are now keenly aware of the need to refine the application of past discoveries through service research and to identify the most cost-effective method of providing treatment, resulting in evidence-based medical practice.

Oral & Maxillofacial Surgery is well placed to meet these needs as the discipline has a strong academic base within the Dental Schools in the United Kingdom. Close links with the Universities provides access to laboratories and inter-action with complementary disciplines (oral pathology, virology, molecular biology, material sciences, etc.) that produce both the appropriate environment and critical mass that is fundamental to
effective research. The future potential of maxillofacial surgery is readily found in its research portfolio.

There are active research projects in head & neck cancer, craniofacial trauma, day case and high volume surgery, facial deformity and salivary lithotripsy.

The research activities within academic departments of oral & maxillofacial surgery are reported in a regular newsletter "Cutting Edge" and many presentations at scientific meetings and papers in a range of journals.

**The Medical Students and Basic Surgical Trainees Group**

This group formed in 1999 from the well established medical students group, combining with basic surgical trainees.

There has been concern in the past that there are declining numbers of doubly-qualified trainees returning to the specialty and it was felt that isolation from the specialty during the years in basic surgical training (pre-registration and SHO posts) was a contributing factor. With the advent of Foundation training and the inclusion of OMFS in core training, there is renewed interest in specialty, not least from medical graduates who return to dental school to complete the training requirements for entry into the specialty.

In support of this group, the BAOMS allows students undergoing their second degree (medicine or dentistry) in pursuit of training in oral & maxillofacial surgery to have their fees to the Association waived upon request to the Association, provided that they have been a paying Member of the Association for at least one year.

**Maxillofacial Trauma**

Maxillofacial trauma is injury to the facial soft tissues, facial skeleton and associated specialised soft tissues within the head and neck as a result of wounding or external violence. The Oral & Maxillofacial Surgeon is an essential part of comprehensive Accident & Emergency Services in the management of these injuries, both primary and secondary. In the more severe injuries, the OMF Surgeon works in close collaboration with many other specialties, in particular neurosurgical and ophthalmological colleagues.

**Incidence**

A population of 500,000 yields in excess of 4,000 facial injuries per year, of which 250 will be facial fractures, excluding simple nasal fractures. The incidence of facial fractures continues to rise. In the United Kingdom, the major cause of trauma to the facial area is inter-personal violence, with the incidence of injuries from road traffic accidents showing a decline in recent years. This may be a reflection of the effectiveness of seatbelt legislation, improved car design and safety equipment, and improvements in pre-hospital care and rapid patient transfer to trauma-accredited hospitals. This has lead to an increase in the number of patients arriving at hospital with multi-system trauma and severe facial injuries.

A national facial injury survey, conducted by BAOMS in 163 Accident & Emergency Departments across the United Kingdom, identified in one week 6,114 patients who presented with facial injuries. This study found that:
nearly a quarter of facial injuries in all age groups were associated with alcohol consumption
one in three of these had serious facial injuries requiring specialist treatment or hospital admission
at least half a million facial injuries occur in the United Kingdom annually and 180,000 are of a serious nature
assault was the cause of 25% of facial injuries, i.e. at least 125,000 facial injuries per year are caused by assault
40% of assaults caused serious facial injuries
51% of assault victims had drunk alcohol within 4 hours of the injury
40% of all the assaults occurred in the 15-25 age group and more than 40% of these caused serious facial injury
more women than men were assaulted in the home, nearly half of all assaults on women occurred in the home. Overall, however, 4 men were assaulted for every assault on a woman.
road traffic accidents caused 5% of facial injuries, but more than 40% of these resulted in serious facial injury
1 in 6 patients involved in road traffic accidents had drunk alcohol within four hours of the injury
10% of patients with facial injuries caused by falls had drunk alcohol within four hours of the injury

These findings confirm that facial injury has a major impact on the provision of Accident & Emergency Services and the essential role the oral and maxillofacial surgeon has in managing these patients.

Management

Advanced Trauma Life Support (ATLS) to accident victims is delivered by a multi-disciplinary team and trainees in oral & maxillofacial surgery are expected to have
successfully completed the ATLS Course. The skeletal and soft tissue anatomy of the craniofacial region is complex and a specialist’s knowledge of the oral cavity and surrounding structures, both anatomically and functionally, is essential for successful management of patients with facial injury.

Injuries to the maxillofacial area are routinely treated by the technique of open reduction and internal fixation, using a variety of micro, mini and reconstruction plating systems. This has lead to early restoration of function and rapid rehabilitation, but there is no doubt that many serious facial injuries can cause permanent facial disfigurement and psychological distress with extensive soft tissue scarring presenting a particular challenge to the oral & maxillofacial surgeon.

In collaboration with neurosurgical colleagues, it has now become possible for simultaneous management of severe craniomaxillofacial trauma to be dealt with in a single stage, often using a shared surgical access. The use of advanced imaging techniques such as CT scan, MRI and Stereolithography are used to demonstrate the pattern of cranial and facial bony injuries and to plan better primary treatment. Modern oral & maxillofacial surgical techniques have resulted in early restoration of function and return to work and have reduced the need for secondary reconstruction and scar revisions. It is essential that all facial injuries are referred to the oral & maxillofacial surgeon.

**Dentoalveolar Surgery**

The alveolus is that part of the bone of the jaw which supports the teeth and may be involved in any disease process affecting the teeth, jaws and surrounding structures. Dentoalveolar surgery, therefore, is the surgical management of diseases of the teeth and their supporting hard and soft tissues. It does not include dental surgery, (i.e. the restoration of teeth and provision of crowns, bridges and other prostheses).
Impacted and ectopic (misplaced) teeth may result in a number of irreversible hard and soft tissue pathological conditions which can reach an advanced stage with minor or no symptoms, demanding a carefully balanced decision as to the timing of surgery.

Difficult impactions can be one of the most demanding procedures in maxillofacial surgery, carrying a significant risk of nerve injury and, without question, removal is most safely carried out by an experienced surgeon.

There is a very large range of benign and cystic lesions of the mouth and jaws, including benign tumours, metabolic disorders of bone, and many cystic lesions which are all progressive and can cause pain, infection, weakness and deformity of bone. With increased specialisation, more and more patients will be referred to oral & maxillofacial surgeons and their colleagues in oral surgery and surgical dentistry working in Maxillofacial Units.
Oro-facial Cancer and Reconstructive Surgery

The specialty has a leading role in the management of oro-facial cancer and head & neck cancers in general, with close relationships with other specialties, in particular oncology and radiotherapy.

Oro-facial cancer is a serious malignant disease, which is fatal if not treated, and in the oral cavity usually begins as a rough patch, ulcer or lump affecting the lip, tongue and floor of mouth with a significant tendency to metastasise to the cervical lymph nodes.

Over 2,000 new cases are reported each year in the United Kingdom, with a 5 year death rate of approximately 50%. This is similar to the death rate for other cancers, such as breast cancer, but shows a worsening trend in the last decade against, for example, carcinoma of the cervix where early diagnosis, due to a national screening programme, has improved the prognosis for many patients.

Targeted screening of high risk groups within the population, ie. heavy smokers and drinkers, could improve the situation but at present this does not exist in the United Kingdom. Screening of low risk groups and regular dental patients will probably not have any impact on referral patterns. It remains a fact that over 50% of cancers affecting the oral cavity and head and neck region present as advanced stage disease, with relatively poor outcome of treatment compared with Stage I presentations.

A significant number of oral cancers go through a pre-malignant state before becoming invasive cancers. These potentially malignant lesions are clinically white or red / speckled oral mucosal lesions (leukoplakia / erythroplakia). These lesions are curable if excised (either by surgery or laser surgery) and the risk factors controlled. Some pre-malignant lesions can be managed by regular review, with or without medical treatment. There is now a requirement of all medical & dental practitioners who suspect a patient of having malignant disease to refer that patient to be seen by an appropriate specialist within 14 days. There is, therefore, no role in general practice to investigate suspicious lesions in the oral cavity either by vital staining, biopsy or other investigations. All these patients should be referred to an oral and maxillofacial surgeon specialising in malignant disease of the head and neck.

Patients with orofacial cancer should be referred to the multi-disciplinary team (MDT) dealing with head and neck cancer. Such teams are centralised in Cancer Centres, with satellite clinics in Cancer Units. The broad spectrum of specialties involved in the management of head and neck cancer, and their support services, requires a large and complex team approach.

In consultation with radiotherapists and oncologists some patients will present with lesions treatable by primary radiotherapy. Most of these lesions will be small and accessible, but others are those extensive presentations where surgical resection is considered impossible and where the outcome is likely to be very poor.

A majority of patients require tumour resection, defect reconstruction and subsequent rehabilitation to enable the patient's return to society. Depending on the findings at the time of the surgical resection, a proportion of these patients will also require post-operative radiotherapy treatment.
The role of free tissue transfer has revolutionised the surgical options in reconstruction of ablative cancer resections (and also traumatic defects and some congenital deformity syndromes). The surgical challenge in the reconstruction of the face and jaws uniquely involves the restoration of the facial skeleton as well as the soft tissues of the face and mouth. Stereolithography has recently added a new dimension in the planning of complex facial and orbital defects.

Maxillofacial reconstructive techniques are not as yet able to restore the function of tissues that are replaced with the exception of the mandible. For example, tissue to replace the tongue can never fulfil the functions of speech, taste and swallowing so important to a patient's quality of life. Although it is technically possible to transplant a tongue with its nerve and blood supply, further research will have to be carried out to assess the function and reliability of such techniques. On the other hand, we can replace the structure and function of the mandible by transferring bone and soft tissue and then placing osseo-integrated implants to which a prosthetic appliance can be attached to restore the function of chewing as well as restore a patient's appearance and smile.

The soft tissue component of the radial forearm flap is a favoured method of reconstructing the soft tissues of the mouth and pharynx. This flap can be made sensate by incorporating the antebrachial nerve of the forearm and anastamosing this nerve to a donor nerve in the oral region. The improved sensation can help initiate the swallow reflex and improve overall oral function.

Reconstruction of the mandible is necessary in about 30% of oral cancer resections. Techniques include the use of the vascularised fibula, iliac crest and scapula flaps and, in selected cases, the immediate placement of implants in the grafted bone enables rapid rehabilitation of oral function.

Maxillectomy defects, which may be so extensive as to include removal of the eye, may be treated by obturation with a prosthesis to fill the large defect which communicates between the eye socket and the oral cavity. A combination of intraoral and extraoral implants (for example in the supraorbital rim) offer considerable advantages in these situations.

However, the restoration of the excised bone and soft tissues with a vascularised graft from the iliac crest, incorporating one of the muscles that lie in the abdominal wall, may be a better option for many patients. This allows the patient to wear a denture which can be supported by implants in the reconstructed maxilla and the eye can be restored with a separate implant-retained orbital prosthesis.

The psychological suffering associated with facial disfigurement and oral dysfunction is a considerable burden to many patients, from facial scarring and port wine stains to a severe maxillofacial injury or extensive resection for head and neck cancer. These patients require practical and psychological help in their struggle to restore their lives and the multi-disciplinary team approach, to include speech therapists, dieticians, nurse liaison support and palliative care, and care in the community, all play a vital role. Any surgical intervention in the treatment of oro-facial disease involves a multi-disciplinary team approach.

**Orthognathic Surgery**
“Surgery to create straight jaws” is the literal meaning of orthognathic surgery. Such corrections are largely achieved by osteotomies, surgical techniques by which parts of the jaw are cut to create separate fragments which can then be moved into new positions with preservation of their blood supply.

The most common indications for such procedures are the correction of facial deformity, dental appearance, eating and biting problems caused by malocclusion and speech abnormalities. The most commonly seen conditions, which can be corrected by orthognathic surgery, are prominence or lack of development of the upper or lower jaw. Vertical discrepancies, for example when there is too much or too little exposure of the upper front teeth and open bite deformities where the teeth do not meet, are also managed in this way.

When there is facial asymmetry, perhaps because one side of the face has failed to develop properly or alternatively has grown too much, orthognathic surgery may be used to correct the problem. Orthognathic surgery also has an important role to play in the management of congenital craniofacial syndromes, for example clefts of the lip and palate and other deformities of development of the face and skull.

In most cases, this is elective surgery and the informed wishes of the patient are paramount in deciding whether to carry out treatment. Except in the most severe deformities, or when there are major psychological or social problems, surgery is usually delayed until around 16 years of age when most jaw growth is complete.

In the management of these cases, the oral & maxillofacial surgeon works very closely with an orthodontist experienced in such conditions. The vast majority of orthognathic cases require a period of orthodontic treatment with fixed appliances in preparation for surgery. This enables optimum correction of the dental occlusion as well as the appearance of the face and teeth. Following surgery, the orthodontist needs to complete the tooth positioning and this may take from as little as 3 months up to 18 months in difficult cases.

Whilst this is major surgery, which carries with it the risk of significant complications, a number of factors have made orthognathic surgery very safe and thus in great demand. Prominent among these are good orthodontics, accurate pre-operative planning on models and computers, modern anaesthetic techniques and techniques of airway control, and the use of hypotensive anaesthesia to reduce blood loss. In addition, modern instrumentation provides accurate methods of cutting bone and precise and reliable methods of fixing bones, therefore avoiding intermaxillary fixation and external fixation. Good surgical technique, combined with the use of antibiotics and steroids reduces post-operative swelling to a minimum and as a result operating times and length of stay in hospital have reduced considerably.

**Cleft Lip and Palate**

Cleft lip and palate is a common congenital anomaly occurring in 1 in 600 births and presenting in a wide variety of forms and combinations. Cleft lip ranges from notching of the lip to a complete cleft, involving the floor of the nose and may be associated with a cleft of the primary palate (alveolus / pre-maxilla) and with clefts of the secondary palates (hard and soft palate).
Clefts may be unilateral or bilateral, complete, incomplete, or microform. Cleft palate may occur in isolation, may be unilateral or bilateral, and ranges from a bifid uvula to a complete cleft of hard and soft palates. It may also present in a sub-mucous form. Clefts may be part of very many syndromes affecting the first and second branchial arches, including the Pierre Robin anomaly.

The deformity has a potential effect on facial appearance, hearing, speech, feeding and social integration. Indicators of poor outcome, dysfunction and deformity include recurrent otitis media (glue ear), hearing loss, speech anomalies, patent oro-nasal fistula, problems with eating and swallowing and psycho-social difficulties.

It is, therefore, essential that care is multi-disciplinary involving at least a cleft surgeon, otologist, speech and language therapist, orthodontist, paediatrician, paediatric anaesthetist, specialist paediatric nurses, restorative dentist, clinical psychologist and clinical geneticist.

Primary surgery, however, is central and the choice of technique based on a full understanding of the structures involved, and understanding gained from a training in dentistry, is of paramount importance. The aim of cleft surgery is the restoration of normal anatomy and the promotion of normal growth and development of all structures affected by the cleft. Emphasis must be placed on the restoration of muscle continuity whether of the lip and/or nose, or the soft palate. Techniques in which these concepts are promoted have been shown to produce the most acceptable results in the long-term. In reality, given even the most favourable circumstances, secondary surgery may be required and a return to the basic principles employed in primary surgery rather than modifying the existing state is necessary.

However, there are other surgical procedures that are required as the child grows older. Where problems with speech exist, that cannot be resolved by therapy alone, velopharyngeal surgery may be necessary. Following assessment, this includes revision palatoplasty, palatal lengthening or pharyngoplasty. Later, in clefts involving the alveolus, bone grafting is carried out usually between the ages of 7 and 11 years. When growth is complete orthognathic surgery to correct abnormal facial bone development, in particular an under-developed maxilla, may be needed. Finally, there may be residual deformities of the nose and rhinoplasty will be required. Ultimately, the adherence to an agreed protocol working in a fully equipped and co-ordinated setting with a full complement of concerned professionals and the facility for collection of data such that problems can be identified and corrected at the earliest possible opportunity, will enable the surgeon to ensure the best outcome.

Designated Cleft Lip and Palate Centres have been identified in the UK, where a multidisciplinary team looks after patients from birth.

**Craniofacial Surgery**

Craniofacial surgery is concerned with the management of patients presenting with congenital or acquired conditions, affecting the hard and soft tissues of the head and face. The Department of Health approves and funds designated centres for the management of craniofacial conditions including:

- Craniosynostoses
- Craniofacial dysostoses
- Orbital dysostosis
- Encephaloceles
- Craniofacial clefts

These conditions are evident early in life and most patients are children under the age of 2. Patients referred to designated units are assessed and investigated by a multidisciplinary team and treatment combines the principles of maxillofacial reconstruction with neurosurgery. The surgical techniques employed in congenital conditions can also be applied to good effect in the treatment of skull base tumours and craniofacial trauma.
Premature fusion of one or more skull sutures (craniosynostosis) occurs in 1 in 2,000 of the population. Syndromic craniosynostoses, such as Crouzon and Apert syndromes occur in 1 in 10,000 and 1 in 150,000 live births respectively. Facial clefts are even rarer.

Historically, patients underwent numerous procedures performed by various clinicians from different surgical specialties. Results were generally poor and associated with high morbidity and even mortality. Many patients with severe deformity were denied surgery, because of the risks involved. In the 1960's, Paul Tessier showed that facial surgery could be safely combined with neurosurgery. Craniofacial surgery was born and has continued to evolve.

The surgery is major, often protracted and associated with significant blood loss in the small child. Intensive care is needed for the more complex cases, or where the airway is compromised. Some children require more than one procedure as growth and dental development influence facial form and function. However, with an active, established team and utilising contemporary techniques, such as distraction osteogenesis, it is possible to perform fewer, more extensive procedures. The results are better and there are fewer complications.

The craniofacial principles of wide surgical exposure, primary bone grafting and internal fixation should be applied to the management of complex craniofacial trauma. Severely injured patients of all ages can be stabilised and offered early definitive treatment using these techniques. Morbidity is reduced and hospital stay shortened and there is an overall improvement in outcome. These surgical approaches can also be used to access intracranial and skull base lesions.

The management of craniofacial patients requires a collaborative and multi-disciplinary approach if optimal results are to be achieved and the core disciplines are usually maxillofacial, plastic and neurosurgery, supported by anaesthetic, ENT, ophthalmic and specialist nursing colleagues. By drawing on expertise gained in the management of trauma, tumour and congenital disease of the soft and hard tissues of the face, the maxillofacial surgeon plays a key role in craniofacial surgery.

**Skull Base Surgery**

The base of the skull is a complex and relatively inaccessible region. Pathology in this area may arise from either within the skull itself or from adjacent areas such as the paranasal sinuses, the orbit and the face.

Conventional approaches to skull base lesions frequently require prolonged retraction of the brain and/or the resection of uninvolved structures to improve exposure. The resultant morbidity of such techniques, in terms of both cerebral function and facial appearance were often considerable with the result that many deep-seated skull based tumours were considered inoperable. The limited access also made adequate reconstruction of defects difficult and, in some cases, impossible.

Recent developments in surgical approaches to the skull base are based on the temporary disarticulation or dismantling of the skeleton of the face and the skull to varying degrees. These bone segments are mobilised either as free bone segments, completely detached from the soft tissues, or pedicled to the soft tissues to retain their blood supply. In most cases the so-called "access osteotomy" is combined with a
conventional craniotomy. Facial incisions are avoided wherever possible - the coronal scalp flap and intraoral incisions providing adequate exposure in many cases. If facial incisions are necessary, these are carefully sited and will usually heal with an imperceptible scar.

Maxillofacial Surgeons, by virtue of their training in surgery of the facial bones and soft tissues, have contributed significantly to the development of the surgical access techniques now in common practice. The field of skull base surgery is developing rapidly. Sophisticated imaging techniques accurately identify both the position and dimensions of lesions and, in some cases, correctly diagnosing their nature. Interventional radiologists can reduce the blood supply of tumours and vascular abnormalities further decreasing the potential morbidity of surgery, which at times allows surgeons to treat previously inoperable lesions.

The recent development of "navigation" systems enables surgeons to pinpoint their position in three dimensions at the time of surgery, which is of particular value where the pathology has destroyed the usual anatomical landmarks. The selective use of minimally invasive techniques and focused radiosurgery will also become more common as the limits of such techniques are appreciated. Notwithstanding these developments, adequate access to skull base pathology will remain an essential requirement for successful surgical treatment.

**Stereolithography in Maxillofacial Surgery**

Stereolithography is an industrial process which uses data generated from computer-assisted design (CAD) to generate three-dimensional models. The data drives a laser over a bath of photosensitive resin which produces a series of stacked slices, and an accurate three-dimensional industrial prototype or model. This technique can be used by the maxillofacial surgeon to produce three-dimensional representations of facial bony structures using data from CT or MRI scans.

These so-called bio-models can be extremely useful in a number of particular clinical situations involving bony facial deformities, as this process allows the accurate visualisation of the facial skeleton. It is an invaluable aid to both the diagnosis and treatment planning of congenital, developmental and post-traumatic conditions affecting
the facial region. In particular, it allows the maxillofacial surgeon to appreciate spatial displacements in all three dimensions and to make accurate measurement of the deformity.

The correction of post-traumatic or development facial asymmetry has always been difficult. Great accuracy is required to achieve a successful surgical result, due to the fact that facial deformity and asymmetry is often the result of relatively small magnitudes of bony displacement or deformity. The surgeon is then able to practice the surgery on the model, thereby allowing full appreciation of the osteotomy bone cuts required to achieve the desired results, together with any areas which may require augmentation with bone grafts. Finally, the means of fixation of the realigned bony segments can be predicted. Valuable theatre time can be saved, by allowing the pre-operative of bone plates to be used for fixation on the "post-operative" bio-model that demonstrates the planned realignment of the facial bones. This technique also ensures there is surgical accuracy in achieving the planned outcome for the patient.

Stereolithographic bio-models can also allow the measurement of volume estimation of both bony structures for possible implantation and of bony cavities for reconstructive purposes. Stereolithography has been used in maxillofacial surgery in the following situations:

- The diagnosis of and planning of corrective surgery for congenital facial deformities
- Late reconstruction of complex bony facial trauma
- Orbital volume estimation, for the correction of post-traumatic enophthalmos
- Orbital reconstruction, following ablative surgery for malignancy
- Evaluation of bone availability for the placement of osteo-integrated implants, both extra and intra oral
- The pre-operative adaptation of temporomandibular joint prostheses for the treatment of advanced, degenerative joint disease, or post-traumatic bony ankylosis
Facial Aesthetic Surgery

Facial appearance is of the utmost social and psychological importance. There tend to be fairly standard ideals of what constitutes a "normal" or beautiful/handsome face and many attempts have been made to quantify the proportions of the face and the produce the "ideal" face as a guide to artists and surgeons. Variations from the "norm" are often perceived as imperfections, or even outright ugliness by individuals who seek surgical correction. They are often self-conscious, lack confidence and may even be psychologically disturbed by their appearance. Other people may suffer an exaggerated ageing appearance which can be accelerated and accentuated by excess ultra-violet irradiation (photo-ageing), smoking, excess alcohol, diet or a combination of all four. Finally, and probably most importantly, faces can be disfigured as a result of facial injury or as a result of surgery for malignancy.

Facial aesthetic surgery is part of the training programme for higher surgical trainees in oral & maxillofacial surgery and as a specialty we have extensive knowledge of the growth, development, anatomy, function and inter-relationships of all components of the face and jaws. The commonest procedures undertaken are:

- Rhinoplasty, to alter the shape/size of the nose and to improve nasal function
- Pinnaplasty, to correct the fairly common deformity of "bat ears"
- Genioplasty, to correct deformity of the chin
- The ageing face, where the muscles start to sag, causing the over-lying skin to sag also. This causes lines, grooves and wrinkles to appear.

The problems can be improved by many procedures, including forehead lift, blepharoplasty ("eye bag" removal), rhytidectomy (face lift), cheiloplasty, where lips can be re-shaped with or without fillers such as collagen, Gortex strips or fat transfers. Skin texture and appearance can be improved by topical application of vitamin A related components, chemical peels or laser skin resurfacing. The latest chemicals include fruit acids. Acne scars can also be improved by these techniques and collagen can be injected as a filler for wrinkles, depressed scars and thin lips. The results can be quite good, although may be temporary and require frequent repeat treatment sessions.

In addition, the techniques of orthognathic surgery can vastly improve facial appearance
and function and overall well being and can be done in combination with facial aesthetic procedures.

**Minimally Invasive Surgery**

Both lasers and cryosurgery avoid the use of the scalpel and obviate the need for suturing. Certain laser wavelengths in the near and mid infra-red can be taken down fibres into body cavities such as the temporomandibular joint, allowing a link with endoscopy. Excision of tissue by lasers is characterised by minimal scarring, for example of the oral mucosa, thought to be due to inhibition of myofibroblasts. Heat coagulation of tissue by penetrating laser wavelengths (eg. Nd:YAG) and cold protein coagulation as by cryosurgery, leaves the body repair mechanisms to separate the devitalised tissue. In this process there tends to be a release of cytokines encouraging regeneration and an enhancement of local immune mechanisms.

Both lasers and cryosurgery have effects on nerve fibres, particularly the finer non-myelinated pain fibres, reducing pain by comparison with conventional surgery in general.
Lasers

Lasers may be classified under the following headings:

- High intensity laser therapy (HILT) - is used to cut or ablate tissue. For cutting a tissue a temperature of 100deg.C needs to be attained to boil the interstitial water, while for coagulation 60deg.C is necessary for full coagulation of proteins.

Cutting abilities of lasers are most useful in mucosal sub-surfaces for the removal of pre-malignant and early malignant lesions with minimal scarring, pain and tethering. The coagulating capabilities are best employed for vascular lesions such as cavernous haemangiomata. Care must be taken in the vicinity of nerves which will be damaged and cryosurgery can be combined with lasers to allow nerve regeneration.

- Selective Laser Therapy (SELT) - in this situation, one cellular population is selectively destroyed, leaving adjacent cells intact. There are two main methods:

  a.) selective photothermolysis - an example of which is the treatment of port wine stains of the face where a tunable dye laser may be used to produce yellow light in the 585 nanometer range. This will penetrate through the epidermis without significant absorption, to be taken up by the chromophore of oxyhaemoglobin in the capillary haemangioma, allowing selective damage to the intima.

  b.) photodynamic therapy - which involves the administration of a light-sensitising drug which is then activated by light, usually monochromatic (eg. 630nm helium neon laser). The interaction in the presence of oxygen precipitates cell killing. This photo-chemical reaction can be used to treat malignancy and pre-malignancy at a number of sites within the body. In terms of head and neck oncology a variety of photo-sensitisers have been used, each of which has different characteristics.

For example, dysplasia can be managed using aminolaevulitic acid which produces a relatively superficial zone of tissue necrosis and leaves the patient photosensitive for a short period of only 24 hours. Healing is uneventful and takes place without any scarring. Invasive tumours can be treated with a more powerful sensitiser, such as foscarn which produces a depth of necrosis up to 1cm with surface illumination. This allows early invasive squamous carcinoma to be treated and the method is of particular use with field change disease and multifocal squamous cancer.

In addition to surface illumination, photodynamic therapy can be carried out by intralesional implantation of laser fibres with up to four point sources being treated at one time, producing necrosis with a radius of about 1cm. The disadvantage of this treatment is that the patient may remain sensitive to light for about three weeks and, because of the more powerful nature of the effect, there does appear to be some post-operative scarring.

The only drug that is currently licensed for treatment on a world wide basis is photofrin which is a dihamatoporphyrin ether / ester mixture. This produces an intermediate range of necrosis down to about ½ cm with quite a prolonged period of photo-sensitivity, up to six-eight weeks. Healing takes place with virtually no scarring. It should be emphasised that at present, though this treatment offers great potential, the only routine services are
being offered on study protocols. There are currently about 14 units in the United Kingdom carrying out PDT on a regular basis with some units having extensive experience with numbers in excess of 200 patients treated.

Low Intensity Laser Therapy (LILT) - low power lasers in milliwatt ranges rather than the range of watts for HILT are used in the augmentation of healing, such as intractable orofacial ulcers, using a visible red light at 630 or 660nm or near infrared irradiation around 830nm singly or in combination, and in pain control. Using the near infrared irradiation of a gallium aluminium arsenide laser at 820-830nm which penetrates at high energy densities, pain alleviation appears to be due to direct effects on fine nerve fibres, augmentation of cellular enzyme systems important in repair, and in some instances endorphin release.

Cryosurgery

For destruction of normal tissue, the attainment of a temperature of at least -15°C is necessary to produce intra-cellular ice formation, although for the destruction of malignant neoplasms -50°C is advocated. The normal ice ball shows the -2°C isotherm. The most potent method of freezing is by the use of phase change apparatus employing liquid nitrogen, where probes reach a temperature of approximately -180°C and a spray -198°C. Lesser potency may be obtained by the throttled gas method, classically employing nitrous oxide under pressure. In general, liquid nitrogen apparatus is indicated for the management of malignant disease and for lesions of bone, in view of its greater potency of effect. The main uses for cryosurgery in the orofacial region are:

- Soft tissue ablation: cold necrosis may be produced in such lesions as haemangiomas or exophytic T1 carcinomas. Care should be taken in treating large areas of leukoplakia as a stimulant effect can be produced in peripheral zones.

- Pain Control: temporary anaesthesia may be produced for about 6 months by freezing peripheral branches of the trigeminal nerve, which may be useful in certain cases of trigeminal neuralgia.

- Bone may be frozen to remove residual aberrant tissue. At least -15°C needs to be obtained and liquid nitrogen spray is most applicable to uneven bone cavities. A pressure of between 8-10 lbs per square inch is indicated and cell ethal penetration occurs at a rate of approximately 3mms per minute, ie. about 3 minutes to freeze 1cm in depth. The method is particularly useful for keratocysts and benign neoplasms of bone, such as ameloblastoma. The lesion should be curetted and then freezing carried out for a suitable time, depending on the lesion. If the mandible is already significantly weakened by tumour, there is a risk of pathological fracture in the third month after freezing, when re-modelling takes place. This can be offset by inserting a cancellous bone graft at the time of the original operation.

Both lasers and cryosurgery present a spectrum of exciting methods which result in a new concept of conservative surgery, augmentation and biomodulation. It is anticipated that they will find a special role in combination with gene therapy in the future, in relationship to orofacial malignant disease. Lasers lend themselves to gentle ablation of tissue with lack of bleeding and pain, while cryosurgery has special merits in relationship to nerve and bone which may regenerate after therapy. Both modalities of treatment are extremely important in the practice of oral & maxillofacial surgery.
Pre-Prosthetic Surgery and Dental Implants

This is an important sub-specialty within dentoalveolar surgery and involves the restoration of oral and facial form and function that has been rendered deficient through loss or absence of teeth and progressive loss of related bony structures. A similar need may arise as a result of natural disease processes, trauma and surgery for tumours and related conditions.

The aim of pre-prosthetic surgery is to provide an environment for a prosthesis that will restore oral function, allowing normal mastication, speech and swallowing. By providing a stable and retentive prosthesis, gagging can be prevented along with reduction of pain and discomfort. This will also satisfy aesthetics and improve a sense of personal wellbeing. Nowadays the scope and effectiveness of pre-prosthetic surgery has been extended by the application of endosteal dental implants alone or in combination with other surgical treatment, such as soft and hard tissue augmentation with grafts.

The endosteal implant is a device made of a biocompatible material, usually titanium, which is placed within bone and in time becomes directly attached to vital bone tissue, a process termed osseointegration. When placed within the jaw bone, implants can carry a fixture to provide anchorage for a dental prosthesis and they may also be placed into the skeleton of the face or skull to retain prosthesis such as artificial eyes, ears, noses or other missing parts of the face.

Dental implants are used in the rehabilitation of patients following cancer surgery and can be inserted into bone grafts used to reconstruct the jaw, to allow artificial teeth to be worn to restore function. They can also help to retain obturators used to seal defects in the palate and have a role in the management of congenital abnormalities such as cleft lip and palate.

Patients who have lost teeth have sometimes been described as "oral cripples", unable to bite and chew effectively or speak clearly and in some cases totally unable to wear dentures. Such patients not only suffer physically, but they also suffer psychologically, becoming embarrassed in company and increasingly anxious, and in some instances become reclusive. The placement of dental implants has now been well proven to be highly predictable and developments in relation to immediate replacement of lost teeth and immediate or early loading of dental implants is transforming this field of practice. Once again, the oral & maxillofacial surgeon has an important role, particularly in the more complex cases requiring bone grafts and multiple fixture placement, and it is important that these treatments are provided within the context of a multi-disciplinary team including restorative dental surgeons and dental hygienists.

Because of the relative expense of treatment, there is a limited availability within the National Health Service, but it is becoming increasingly apparent that the treatment of choice when teeth are lost is to replace the missing teeth with a prosthesis based on an osseo-integrated implant. In the long term it is possible that such treatment will be very cost effective.

Facial Pain

Because of the broad and extensive training of oral & maxillofacial surgeons in the field of dentistry and medicine, the specialty is highly knowledgeable and skilled in the
diagnosis of facial pain which can be the presentation of a vast range of pathological and psychological conditions. The differential diagnoses of facial pain include common toothache and other dental causes, sinus disease, neuralgias such as trigeminal neuralgia and rare conditions including malignancy in the oral cavity, orpharynx, nasopharynx and skull base.

Pain due to temporomandibular joint disorders affect a significant proportion of the population at one time or other with various symptom patterns such as facial arthromyalgia, atypical facial pain, atypical odontalgia, oral dysaesthesia and 'phantom bite'.

The diagnosis can often be made by taking a careful history of the pain and a range of investigations are useful, including radiographs, CT and MR scans and ultrasound in addition to thorough clinical examination.

Management is sometimes carried out with other specialties including neurologists, neurosurgeons, clinical psychologists, psychiatrists and consultants working in pain clinics.

**The Temporo-mandibular Joint**

The temporomandibular joint is unique. It is a ginglymo-diarthrodial joint, which is also linked to its contra-lateral counterpart. Such daunting philology suggests complexity and this indeed is the case.

In general, there are two groups of patients with temporomandibular joint disorders; those with normal anatomy, but abnormal function, and those with abnormal anatomy whose function may be abnormal.

Temporomandibular joint dysfunction is ill-understood, but may affect as many as 40% of the population at some time and is more common in females. It may begin in adolescence with pain and clicking in the joints which often recovers, never to recur. A small group have further problems, some continuing into early adult life before symptoms subside. A very small percentage of these develop increasing symptoms in their 40's and 50's and may end with chronic facial pain. A second group does not recover after the first episode and eventually develops continuous discomfort which may profoundly upset their lives. It is this group for whom various hypotheses have been formulated.

Some regard the dental occlusion as the "third joint surface" and postulate that abnormalities in the way teeth fit together generate disharmony in movement of the joints with symptoms caused by muscle spasm, made worse by emotional upset which can produce an increase in muscle tone.

Psychological causes and stress can increase temporomandibular joint symptoms and TMJ dysfunction patients have higher catecholamine levels than controls and indeed treatment with anti-depressants or sedation improves many of these patients. Many feel this may be the basis of dysfunction symptoms with pain thought to be produced by masticatory muscle spasm. Abnormal habits, playing wind instruments, occlusal disharmony, over-contraction and fatigue of muscles influence it. Conservative
management of the condition includes exercises, advice about diet, altering the dental bite with splints and sedation or anti-depressants.

Whichever the theory followed, treatment involves conservative measures first and about 40-50% of patients will be improved by these alone.

The second main group of patients are those with abnormal anatomy. The simplest is meniscus displacement and in such patients plain radiography is often of little use if there is no hard tissue abnormality. CT scanning is similar, if more accurate. MRI scanning will demonstrate the position of the meniscus and shows the bony tissues of the joint.

Surgical treatment on these patients is only be undertaken after very careful evaluation and trial of conservative treatment. Surgery can be divided into two types: reparative and reconstructive. Repair involves restoring the meniscus to its correct position, repairing it if necessary. In the past, surgery for TMJ disease was less scientific and the results were appropriately variable, but now there is deeper understanding, better investigation and sub-specialisation of surgeons which appears to improve outcome.

This group also includes those with formal joint disease, eg arthritis, ankylosis and iatrogenic disorders. Treatment is aimed at controlling inflammation and decreasing discomfort with anti-inflammatory drugs, including steroid injections, together with manipulation and physiotherapy etc.

Ankylosis is where fusion of the joint occurs and the aim is to restore movement and, in general, there are two groups divided by age. In children, before facial growth is complete, the aim is to restore movement and provide a centre at which further bony growth may take place. This reconstruction surgery is usually with a costo-chondral graft. If mandibular growth is limited distortion of the lower and the upper jaw, causing facial asymmetry, occurs. The treatment of this in later life can be complex involving orthodontics and orthognathic surgery and complex temporomandibular joint surgery.

In adults, movement can be restored by removing the ankylosic mass with reconstruction using either a costo-chondral graft or alloplastic joint prostheses. The latter are expensive and the relatively few patients needing them are best treated in centres regularly performing such procedures.

Patients with temporomandibular joint disease place demands on time and clinical facilities and some are regrettably sufferers from chronic facial pain which is never really relieved to their satisfaction. These patients are best managed by oral & maxillofacial surgeons with a special interest in these conditions.

**Oral Medicine and Oral Mucosal Disorders**

Oral mucosal disorders are common, occurring either in isolation or in association with systemic conditions. In broad terms, these disorders can be divided into four main groups: sore mouth, ulcers, blistering (vesiculo-bullous) disorders, and red and white patches. Many rarer conditions exist which are not discussed in this section.

Sore / Dry Mouth - Patients are usually middle aged or elderly and complain of burning pain with or without dryness. These symptoms may be linked to haematological conditions or, occasionally, conditions such as Sjögren's syndrome where investigations are normal. Reassurance is required and may be sufficient to allow the patient to cope.
Recurrent Oral Ulceration (ROU) - Is the commonest oral mucosal disorder, affecting 10-15% of people, usually when young. Most cases are of minor aphthous ulceration with small, shallow ulcers which heal in 10-14 days without scarring. Major aphthous ulcers are larger, deeper and heal in 4-6 weeks with scarring. It can be difficult to differentiate these from cancer and a specialist opinion should be sought if ulcers show no sign of healing in 2-3 weeks, by referral to an oral & maxillofacial surgeon.

Important clinical associations include other gastrointestinal pathology and unusual but important conditions such as Behcet's disease. Treatment aimed to control symptoms and steroids, usually topical, but occasional systemic are used to reduce the frequency and severity of ulceration. Analgesic and antibiotic mouthwashes reduce the pain of secondary infection.

Vesiculo-bullous Disorders - The main ones are pemphigoid and the potentially fatal autoimmune disease pemphigus. Differentiation is by clinical signs and the level at which the bulla lies, being subepithelial in pemphigoid and intraepithelial in pemphigus. Blood filled bullae can occur, usually on the palate, in the curious but harmless condition of angina bullosa haemorrhagica.

White and Red Patches - The important distinction is between those which are benign and those which are, or are potentially, malignant. There are therefore three main groups. First, infective lesions for example candidiasis which can occur in an acute form (oral thrush) or a chronic form usually associated with the wearing of dentures. Debilitating illness, immuno-suppression and radiotherapy are predisposing factors. Treatment is with anti-fungal therapy or occasionally laser surgery for cases of hypertrophic candidiasis.

HIV infection has numerous oral manifestations, including ulcers, infections, “hairy” leukoplakia and Kaposi's Sarcoma. Immunological conditions include oral lichen planus which is a condition which may affect skin, mucous membranes or both and is found in approximately 1% of the population. In its non-erosive form it may be asymptomatic or cause soreness. Lichenoid drug reactions are common so it is important to check the patient's medication. Steroids, usually topical, are the mainstay of treatment and good oral hygiene helps reduce symptoms. Erosive lichen planus and lichen planus affecting the tongue are considered by many clinicians to be pre-malignant and require very careful follow-up.

Dysplastic and malignant lesions can present as red and white patches. White patches in the oral cavity carry a 6% chance of malignant transformation, higher at some sites such as the floor of the mouth. Management includes the elimination of risk factors, in particular smoking especially when combined with consumption of alcohol, and biopsy and eradication often by surgical laser of patches with dysplastic change. Red patches should always be considered malignant until proven otherwise and it is essential that all these suspicious lesions are referred to the appropriate oral & maxillofacial clinic without investigation or biopsy in primary care.

In summary, many varied and important conditions affect the oral mucosa and a specialist understanding of this area and the associated medical conditions is important for the proper management of patients. Oral and maxillofacial surgeons are referred the vast majority of patients with such conditions sometimes working in collaboration with specialists in oral medicine.
Salivary Gland Disease

Saliva is essential for speech and swallowing and plays an important role in maintaining oral health by maintaining the integrity of the oral mucosa. It contains a variety of proteins with anti-bacterial activity and salts and minerals including fluoride and acts as a buffer and is, therefore, important in the control of dental caries and periodontal disease. Saliva is produced by the three pairs of major salivary glands which are the parotid glands in the preauricular region, the submandibular glands and the sublingual glands in the floor of the mouth. In addition, there are about 200 minor salivary glands distributed widely just below the mucosal lining of the mouth and on the hard and soft palate, cheeks, lips and floor of mouth.

Salivary glands can be involved in many pathological processes, including congenital abnormalities, infections and other inflammatory disorders, obstruction, neoplasia and degenerative disorders. The most frequent problems seen in clinical practice are due to infections, obstruction from stones, benign and malignant tumours and destructive autoimmune disease.

Infections - The mumps virus is the most frequent cause of salivary gland infection. Bacterial infection of the major glands usually arises from the mouth and is often a recurrent problem especially in a gland previously damaged by stones or irradiation or in debilitated patients. With the extended survival of HIV positive patients receiving triple chemotherapy an increasing variety of salivary gland disorders are being seen. A specialist knowledge of dental and oral diseases is necessary for the proper management of these patients.

Obstruction - Calculi or stones can form in the major salivary glands and their ducts, in a manner directly analogous to the gall bladder and bile ducts and the kidney and ureters. They cause obstruction of salivary outflow typically with pain and swelling at meal times. If the obstruction is not relieved the gland becomes damaged and often requires an operation to remove the gland. Obstruction of minor salivary glands also occurs resulting in cyst like swellings in the lips and cheeks.

Tumours - A very large variety of both benign and malignant tumours can involve any of the major or minor salivary glands. Although the majority are benign they grow relentlessly to reach grotesque proportions. Malignant tumours of the salivary glands account for 2% of all cancers in the United Kingdom. The management of salivary gland tumours requires specialised surgical skills due to the proximity of important cranial nerves and the often aggressive nature of the disease. Often patients will require a combination of surgery and radiotherapy to control their disease and should be managed on multi-disciplinary clinics.

Degenerative Disease - The salivary and lacrimal glands are subject to an auto-immune destructive condition (Sjögren's syndrome) which results in dry eyes and a dry mouth. Sjögren's syndrome is often accompanied by other systemic diseases such as rheumatoid arthritis, systemic lupus erythematosis or primary biliary sclerosis. Patients develop severe oral symptoms relating to failure of salivary production and approximately 10% of patients with Sjögren's syndrome will develop a non-Hodgkin's lymphoma. These patients require meticulous follow-up in order to detect the onset of lymphoma at an early stage when treatment is still effective.
**Distraction Osteogenesis**

By performing an ostectomy on long bones Ilizarov a Russian orthopaedic surgeon was able to demonstrate that osteogenesis (new bone growth) could be stimulated by distracting in a controlled manner the ostectomised (divided) bone. This technique has had a major impact in orthopaedic surgery and is a developing technique in oral & maxillofacial surgery. The principal application of the technique is in the following situations:

- Vertical bone distraction of the alveolar ridge in the preparation for the placement of intraoral dental implant fixtures
- Distraction of the mandible by intraoral or extraoral distracters to produce lengthening, either in a jaw that has failed to develop (e.g., Treacher Collins) or in deformity produced by major trauma or as a result of tumour resection
- Mid-face distraction in selected cases may produce significant advancement without the need for full surgical movement and the placement of bone grafts, by distracting the mid-face from the cranium to correct craniofacial deformity.

**Overview**

Oral and maxillofacial surgery is a technically demanding and intellectually stimulating surgical specialty. It can accommodate the generalist who provides a comprehensive service to a local community and the specialist working in designated centres with their practice restricted to the management of more complex conditions.

With the introduction of the European Working Time Directive, structured competency based training and an enthusiasm for rapid progression through the training grades consultant appointment is achieved at about the same age as most of the other surgical specialties. Workforce planning has been in place for many years in OMFS and very few trainees have problems in securing a consultant post on completion of their CCT.