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# Principles of Oral and Maxillofacial Surgery

Sixth Edition

Edited by

**U J Moore**

FDSRCS (Eng), PhD (Ncle)

*Senior Lecturer in Oral and Maxillofacial Surgery*

*University of Newcastle-upon-Tyne*

 **WILEY-BLACKWELL**

A John Wiley & Sons, Ltd., Publication



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## Preface to the Sixth Edition

Oral and maxillofacial surgery continues to develop, with new technologies being embraced. These developments have been incorporated into this new edition for the new generations of students; however, full attention is still paid to the fundamental basis of patient assessment and diagnosis, which form the cornerstone of any surgical specialty. Developing the decision-making process for the learner is one of the more difficult aspects of teaching and learning. We hope that this book still helps in this process.

Explanation of principles has remained the priority and this is still intended as an undergraduate and early postgraduate text.

## Acknowledgements

This textbook had its inception in the early days of the specialty and much has changed within the discipline and the book since then. It is important to continue to acknowledge those who created the environment for these changes and influenced the contributions to this new edition.

I am grateful to Wiley-Blackwell, who have strongly supported the concept of developing a new edition. The process has been much facilitated by their steady yet insistent style of management and I can honestly say it has been a pleasure. It is invigorating to be part of something that feels very positive and my fellow contributors have been equally positive about the process. I would like to thank them for their prompt and relaxed style of authorship.

I am grateful also for any illustrations that have been permitted to be included, as they are essential to the understanding of the text.

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## Foreword to the First Edition

There is an increasing need for trained oral surgeons in the world today. An operative field that was a no-man's-land partly controlled by the general surgeon, partly controlled by the dental surgeon, has now come to be the field of a specialised branch of dentistry.

In the past we have had to use books written and published in America, and, fine though these books are, it is refreshing to find a book produced by a British oral surgeon, because in the world today, British oral surgery has undoubtedly the highest general level of training and achievement in the oral surgical field.

Mr J. R. Moore has had considerable practical experience as an oral surgeon in a consultative capacity before devoting his talents to teaching, and he has produced a book of great practical use both to the student or trainee learning oral surgery and also a book of great interest to the established specialist.

I deplore the fragmentation of the dental profession by dividing it into so many specialities, but in the field of oral surgery there are procedures which the dental surgeon would not wish to carry out. Therefore a knowledge of the difficulties and hazards of an oral surgical procedure is essential for the general dental surgeon, who should include this book in his library.

It is with great pleasure that I commend this work of Mr J. R. Moore of University College Hospital to the profession.

*T G Ward*

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# Chapter 1

## The New Patient

- History
- Principles of examination
- Systematic procedure for examination of the oro-facial tissues
- Special investigation
- Diagnosis
- Treatment planning

It is difficult to overstate the importance of a good history and thorough clinical examination for every patient. It is on this that the diagnosis is made and the treatment plan based. A full, clearly written record of the original consultation is essential to assess progress following treatment. This is particularly true if a colleague should be called to see the patient in the practitioner's absence. The medico-legal importance of accurate records cannot be overemphasised.

In hospital and specialist practice this procedure can seldom be relaxed, but the student and the busy practitioner may find it irksome to maintain a high standard when faced with a series of apparently straightforward dental conditions. Nevertheless, sufficient time must be allowed for an unhurried consultation at the first visit. This will help to avoid errors of omission, and may contribute much to the success of treatment and to the interest of the practitioner. With experience, only important facts need be noted, the dental surgeon considering and setting aside the irrelevant points. This technique can be used with safety only after a long apprenticeship during which many histories and examinations have been methodically completed and all the information recorded. In this chapter a system for interviewing and examining patients, and recording findings, is briefly suggested.

### History

At the first meeting it is important for the clinician to establish a rapport with the patient and to assess attitudes to the clinical situation. Behavioural issues

must be addressed, attempting to put the patient at ease in what is for many a confrontational situation. The interview must be planned to facilitate the process, seating the patient comfortably, adjusting the chair as required to show care, as well as addressing them by the correct name and title. Even at this stage it should be possible to determine whether the patient is anxious or relaxed. The general details of age, sex, marital status, occupation and contact details, together with the names of their general medical and dental practitioner, should be available in the notes but can be checked. The history is then recorded under the headings shown in italics.

The patient will seldom tell their story well. Some will be verbose, others reticent, while the sequence is usually in inverse chronological order with the most recent events first. The art of the good history lies in avoiding leading questions, in eliciting all the essentials, in censoring verbosity and in arranging the facts in their true order, so that the written record is short and logical. Allowing the patient initially to give the history and subsequently writing notes in chronological order while rechecking and summarising the facts verbally, helps the clinician obtain a concise and accurate account of the patient's symptoms.

#### ***Patient referred by***

The name and professional status of the person referring is noted. This facilitates a reply to the referral in the form of a letter.

#### ***Complaints of (CO)***

The patient's chief complaint told *in their own words*. Opinions, professional and otherwise, repeated in an effort to help must be gently set aside and the patient encouraged to describe the symptoms they want cured, and not their views on the diagnosis.

#### ***History of present complaint (HPC)***

This is an account *in chronological order* of the presenting complaint. When and how it first started, the suspected cause, any exacerbating factors and the character of the local lesion, such as pain, swelling and discharge. This includes remissions and the effects of any treatment received. General symptoms such as fever, malaise and nausea are also noted.

#### ***Previous dental history (PDH)***

This records how regularly the patient attends for dental care and the importance they attach to their teeth. Any past experience of oral surgery is included, especially where difficulty occurred in the administration of anaesthetics, the extraction of teeth and the control of bleeding.

#### ***Medical history (MH)***

A summary in chronological order of the patient's past illnesses. Details of prolonged illness or those requiring hospital admission are recorded. Current

medication, which can give insight into the severity of any underlying conditions, and allergies of any kind, particularly drugs that might be prescribed and latex, must be noted. The more important medical conditions are discussed in Chapter 3.

#### ***The family history (FH)***

Occasionally this is of importance in oral surgery. Hereditary diseases such as the haemophilias and hypodontia together with autoimmune disease may be relevant in management of the patient.

#### ***The social history (SH)***

This includes a brief comment on the patient's occupation and social habits, such as exercise, smoking and drinking. The home circumstances are important when surgery is to be performed – that is, whether the patient has far to travel, lives alone or has someone to look after them. These factors may influence the decision to treat as an in- or outpatient.

### **Principles of examination**

The basic principles of examination are the same in all fields of healthcare. It should be made according to a definite system, which in time becomes a ritual. In this way errors of omission are avoided.

From the moment the patient enters the surgery they should be carefully observed for signs of physical or of psychological disease which may show in the gait, the carriage, the general manner, or the relationship between parent and child. Too little time is often spent on visual inspection, both intra- and extraorally. Eyes first, then hands, should be the rule, not both together.

In palpation, all movements are purposeful and logical, and the touch firm but gentle. The tips of the fingers are used first to locate anatomical landmarks and then to determine the characteristics of the pathological condition. The patient's co-operation is sought so that areas of tenderness may be recognised and the minimum discomfort caused. Wherever possible the normal side is examined simultaneously. Only by such comparison can minor degrees of asymmetry be detected. Swellings situated in the floor of the mouth or in the cheek are felt bimanually with one hand placed inside, and one outside, the mouth. Both positive and negative findings are written down as later one may wish to check that at the first visit no abnormality was found in certain structures.

### **Systematic procedure for examination of the oro-facial tissues**

#### **Extraoral examination**

This commences with a general inspection and palpation of the face, including the mandible, maxillary and malar bones, noting the presence of any

abnormality, such as asymmetry or paralysis of the facial muscles. The eyes, their movements and pupil reactions are observed together with any difficulty in breathing.

#### ***The temporomandibular joints***

(See also Chapter 17)

With the surgeon standing behind the patient, the site of the condyles are identified by palpation while the patient opens and closes their mouth. The joints are examined for tenderness and clicking or crepitus on opening and closing. The range of opening and left and right lateral excursion are checked and abnormalities noted.

#### ***The muscles of mastication***

The muscles of mastication are palpated for tenderness. From extraoral, principally this means masseter and temporalis muscles, although medial pterygoid insertion can be palpated at the lower border.

#### ***The maxillary sinuses***

In disease these may give rise to swellings, redness and tenderness over the cheek and canine fossa, nasal discharge and fistulae into the mouth, often through a tooth socket.

#### ***The lymph nodes***

The operator stands behind the patient, who flexes their head forward to relax the neck muscles. Enlarged submental and submandibular nodes can be felt with the fingertips by placing these below the lower border of the mandible and rolling the nodes outwards. The upper deep cervical group can be found by identifying the anterior border of the sternocleidomastoid muscles at the mastoid process and rolling the skin and subcutaneous tissues between fingers and thumb. Working down this muscle to the clavicle and then ascending the neck to palpate the trachea and hyoid regions, the nodes may be felt against other structures such as muscles and underlying bones. With practice, tenderness, consistency and degrees of mobility will be recognised.

#### ***The lips***

These are inspected for lesions such as fissuring at the angles of the mouth, or ulceration.

#### ***The cranial nerves***

In some circumstances examination of all the cranial nerves is undertaken as part of the general examination. In particular this will be when neurological defects are noted and the possibility of intracranial lesions is suspected. The orofacial region encompasses the activity of the majority of the cranial nerves and a degree of familiarity with their action and testing is to be encouraged (Table 1.1). Facial trauma is often implicated in damage of the cranial nerves



**Table 1.1** Cranial nerves. The cranial nerves are listed with their area of activity in which testing must take place. The principal actions are indicated; S = sensory, M = motor (bold indicates main action of nerve, lower case indicates lesser action of nerve)

Number	Name	Action	Function
1	Olfactory	<b>S</b>	Smell
2	Optic	<b>S</b>	Sight
3	Oculomotor	<b>M</b>	Extrinsic muscles of eye
4	Trochlear	<b>M</b>	Superior oblique muscle
5	Trigeminal	<b>S + m</b>	Sensory to face, mouth, teeth; motor to muscles of mastication
6	Abducent	<b>M</b>	Lateral rectus muscle
7	Facial	<b>M + s</b>	Motor to face; taste
8	Vestibular-cochlear	<b>S</b>	Hearing
9	Glossopharyngeal	<b>S + M</b>	Sensation to posterior tongue; motor for swallowing
10	Vagus	<b>M + S</b>	Motor to pharynx, larynx; sensory to viscera; autonomic to gastrointestinal tract
11	Accessory	<b>M</b>	Trapezius, sternocleidomastoid
12	Hypoglossal	<b>M</b>	Muscles of tongue

either intracranially or more peripherally, and even the most superficial dental examination will test branches of the 5th, 7th and 12th cranial nerve.

### Intraoral examination

#### *Mirror examination*

An initial mirror examination of all the structures visible in the mouth, both soft tissues and hard, should be undertaken first to give a clear survey of the general state of the mouth.

#### *The mucous membranes*

The cheeks, lips, palate and floor of the mouth are examined for colour, texture and presence of swelling or ulceration. Comparison of both sides by palpation is essential to discover any abnormality.

#### *The tongue*

Movements, both intrinsic and extrinsic, are tested, as limitation is an important clinical sign in inflammation and early neoplasia. The dorsum is best seen by protruding the tongue over dental gauze with which it can be grasped, drawn forward and, with the aid of a mouth mirror, examined over its length for fissures, ulcers, etc.

### **The tonsils**

These are seen by depressing the tongue with a spatula and asking the patient to say 'Ah'.

### **The pharynx**

Again the tongue is depressed, the patient asked to say 'Ah'. In good light, a small, warm mirror is passed over the dorsum of the tongue, past the uvula, and rotated to show the naso- and oropharynx. This can be demanding both for the surgeon and the patient, particularly those with a pronounced gag reflex.

### **The salivary glands**

The examination of these is described in Chapter 16.

### **The periodontal tissues**

The colour and texture of the gingivae are noted, and the standard of oral hygiene classified, including charting the presence of plaque and calculus. Recession, pocketing and hyperplasia of the gums are measured, and the mobility of the teeth assessed.

### **The teeth**

These are charted for caries and fillings with a mirror and probe. Loose teeth, crowns or fillings are noted.

### **Edentulous ridges**

These are examined for the form of the ridge, retained roots and soft tissue or bony abnormalities. Dentures worn should be inspected *in situ* before being removed to examine the underlying tissues

### **The occlusion**

This is best analysed by taking study models and mounting them on an anatomical articulator and is usual only for assessment of orthognathic cases. However, the occlusal function of natural teeth, bridges and dentures should be assessed at the same time as the teeth are charted.

### **Presenting lesion**

This is the examination of the lesion for which the patient has sought treatment. It may have been included in the general examination mentioned above, but frequently there is a swelling, ulcer, fistula or other disease that requires special attention, the details of which are best recorded under one heading easily referred to throughout treatment.

It is important in examining such pathological entities to determine their site, size, shape, colour, the character of their margins and whether they are single

or multiple. Tenderness, discharge and lymphatic involvement are also important. Swellings should be palpated to determine whether they are mobile or fixed to the skin or to the underlying tissues. They may be either fluctuant or solid. Solid swellings may be very hard (like bone) or firm (like contracted muscle), soft (like relaxed muscle) or very soft (like fat). Induration is a firmness particularly associated with neoplastic lesions. Where a collection of fluid is suspected, fluctuation is elicited by placing two fingers of one hand on each side of the swelling and pressing centrally with a finger of the other hand. Where the lesion is fluid a thrill will be felt. This must be elicited in two directions at right angles, as muscle fluctuates in the longitudinal but not the transverse plane. All pulsatile swellings must be checked to establish whether the pulsation is true or transmitted from an underlying artery.

## Special investigation

The history taken and the examination of the patient having been completed, a differential or provisional diagnosis should be made. This should attempt to establish the disease process and relate it to the tissue involved. It is always useful to consider the main pathological categories (Table 1.2), rejecting those that do not fit the presenting situation. Similarly, the tissues in the area from which the lesion could arise should be identified. In this way a sensible argument may be sustained to support a definitive or differential diagnosis. Special investigations may be necessary to differentiate between these or to confirm a clinical finding. These are not indicated for every patient; indeed, their cost and the delay involved in completing them make it necessary to limit their use. Such investigations are an aid to diagnosis and may also be required for treatment planning. It is convenient to divide the more usual procedures into the four main categories shown in Box 1.1.

The oral surgeon must be quite clear about how the necessary specimens are collected and, even more important, understand the clinical significance of the results. These have been dealt with extensively in other works and the methods of collection of certain specimens are described later in this text in the appropriate chapters.

## Diagnosis

When the special investigations have been completed the surgeon should be able to make a final diagnosis and it is important that this be clearly stated in the notes. Diagnosis is not a matter of intuition but is a 'computer' exercise in which all the information is sorted and analysed. Sometimes it is impossible to reach a decision because of lack of information or knowledge, in which case the

**Table 1.2** The surgical sieve. The consideration of possible pathological processes and the tissues involved may be considered as a ‘surgical sieve’ into one of the holes of which the diagnosis may fit

Pathological categories	Tissue involved									
	Epithelium	Connective tissue	Fat	Muscle	Bone	Blood vessels	Lymphatics	Nerves	Dental tissues	Salivary gland
Hereditary										
Developmental										
Traumatic										
Inflammatory (acute)										
(chronic)										
Cystic										
Neoplastic (benign)										
Neoplastic (malignant)										
Degenerative										
Medical										
Endocrine										

surgeon will need to consult textbooks or papers and may need to seek the opinion of a colleague.

### Treatment planning

Only when the diagnosis is established can a satisfactory treatment plan be made. This should be divided into preoperative, operative and postoperative care, each of which should be planned in a logical sequence, constantly bearing in mind that the ultimate aim is to cure the patient with the least risk and minimal inconvenience.

**Box 1.1** Special investigations commonly used in oral surgery*Local dental investigations*

- A Performed in the surgery
- (1) Percussion of teeth for apical tenderness
  - (2) Vitality tests on teeth
    - (a) Thermal
    - (b) Electrical
  - (3) Radiography
  - (4) Diagnostic injections of local anaesthetic solutions in facial pain
  - (5) Study models for studying the occlusion
  - (6) Photography as a comparative record
- B Requiring special facilities
- (1) Bacteriological investigations, including sensitivity tests
  - (2) Aspiration of cystic cavities
  - (3) Biopsy of tissue

*General investigations*

- A Performed in the surgery
- (1) Temperature of body
  - (2) Pulse rate
  - (3) Blood pressure
  - (4) Respiration rate
  - (5) Cranial nerve testing (see Table 1.1)
- B Requiring special facilities
- (1) Urinalysis
    - Physical examination for colour, specific gravity
    - Chemical tests for sugar, acetone, albumen, chlorides, blood
    - Microscopic examination for cells, bacteria, blood
    - Bacteriological culture
  - (2) Blood investigations
    - Haemoglobin estimation
    - Red cell, white cell and platelet count
    - C-reactive protein (CRP)
    - Bleeding and clotting mechanisms
    - Grouping and cross-matching for transfusion
    - Blood chemistry and electrolytes – calcium, inorganic phosphorus, alkaline phosphatase, serum potassium, chloride, albumen, globulin, urea, glucose (see appendix)
    - Serology
  - (3) Radiographs, CT, MRI scans
  - (4) Electrocardiograph
  - (5) Tests for allergy

**Further reading**

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## Chapter 2

# General Patient Management

- Surgical patients
- Inpatient care
- Intensive care
- Outpatient care
- Follow-up

### Surgical patients

The management of surgical patients can be considered under three headings: preoperative, operative and postoperative. These should form a programme planned to meet the patient's therapeutic need. This chapter is concerned with the pre- and postoperative care, excluding the medically compromised patients, who are the subject of Chapter 3.

Once the treatment has been planned it must be decided whether the patient requires admission to hospital or can be treated on a day-case basis or as an outpatient. Admission as an inpatient ensures more comprehensive care, which can be extended both pre- and postoperatively until the patient is both fit for the procedure and able to be discharged home. Much of the responsibility for the provision of care is entrusted to the nursing staff. Optimal conditions can be maintained with administration of intravenous drugs and appropriate nutrition catering for the particular patient needs. This provides an environment that can seldom be achieved at home, although early discharge is to be encouraged to increase efficient bed use. With this in mind, day-stay facilities where the patient is admitted in the morning to return home postoperatively, some hours after recovery, are increasingly popular. The advantage of this is postoperative supervision by nursing staff during the period when complications related to surgery or anaesthesia may occur, while allowing the patient to return home as soon as possible. However, the home circumstances must allow the patient to be adequately looked after and the patient must be within reasonable distance of help postoperatively should unexpected complications occur. In oral surgery, the majority of outpatients are treated using local anaesthesia, sometimes in conjunction with sedation techniques. Inpatients usually have endotracheal

general anaesthesia of a longer duration than should be administered on a day-stay basis.

The indications for admitting patients to hospital are surgical, medical and social.

### ***Surgical***

The length of surgery – a day case should ideally be around 30 minutes in duration, anything longer than this may require overnight admission, although improvements in general anaesthetic agents have allowed more rapid recovery. If there is a risk of complications such as haemorrhage or fracture of the jaw, or if major surgery is being undertaken with consequent increased morbidity, the need for admission increases.

### ***Medical***

The patient requires collateral management by a physician (e.g. management of diabetes), needs special therapy or skilled nursing care.

### ***Social***

The patient's home conditions are poor, they are living alone, live far away or are anxious to be treated as an inpatient.

Inpatient care demands a wider application of the general principles that underlie the management of surgical patients. It is therefore considered first, though no important difference is implied between the needs of in- and outpatients.

## **Inpatient care**

The date of admission to hospital can be arranged at the time of consultation and waiting lists thereby avoided. Where a waiting list is used it is important to give adequate warning that a bed is available and also to recognise certain surgical priorities, such as the following.

### ***Emergency***

Conditions requiring instant admission, such as acute infections or traumatic injuries.

### ***Urgent***

Conditions that can progress to emergencies if treatment is long delayed, for example subacute infections and neoplasms.

### ***Routine***

Those of no urgency who may take their turn in chronological order.

A patient who is fit and only requires routine surgery is normally admitted the day before the operation, although pre-admission clinics (PAC) can usefully

highlight management issues that can be addressed prior to the actual admission date. Problems related to the administration of a general anaesthetic should be anticipated and an anaesthetic opinion sought (see below). Where special preparation is needed, such as blood investigation, or consultation with other specialists, the time of admission must be calculated to allow for these procedures to take place first.

The patient should be visited by the surgical team within a few hours of admission and findings made at the outpatient examination reviewed and revised if necessary. The pulse, temperature and blood pressure are recorded. Blood tests may be required and should be sent off in time to allow analysis before surgery. The mouth must be carefully examined and the area of surgery reassessed. If teeth are to be removed, any change to the dentition should be noted to enable those beyond conservation to be extracted under the same anaesthetic. Insecure dressings should be replaced to prevent their being dislodged into a socket or wound. Before a general anaesthetic, loose or crowned teeth are noted and the anaesthetist warned. Where extensive haemorrhage is anticipated blood is taken for grouping and cross-matching, and the necessary amount for replacement is ordered. Where grouping is done only as a precautionary measure the serum may be kept for cross-matching if required, but no blood ordered. The nature of the operation and likely complications should be explained to the patient and informed consent obtained in writing for both the anaesthetic and the operation.

It is the role of the surgeon not only to carry out the local treatment but also to supervise the day-to-day care.

### **Relations with the nursing staff**

The surgeon must understand the routine of the wards and the way the patients are nursed. Though it is essential to make daily visits to assess progress and give treatment, these must be arranged to avoid awkward times when the wards are normally closed. The nursing staff spend much time with the patient and have opportunities to hear complaints and observe minor changes that the surgeon may overlook. Their role in motivating the patient during the postoperative period should not be underestimated and their comments can therefore be of great help. They are an essential member of the ward round and should be consulted about progress daily.

### **Informed consent**

Before any procedure is undertaken the patient's informed consent must be obtained. The proposed operation or investigation should be explained in simple language which can be understood by the lay person. The more common complications must be mentioned without causing undue distress. Where a



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