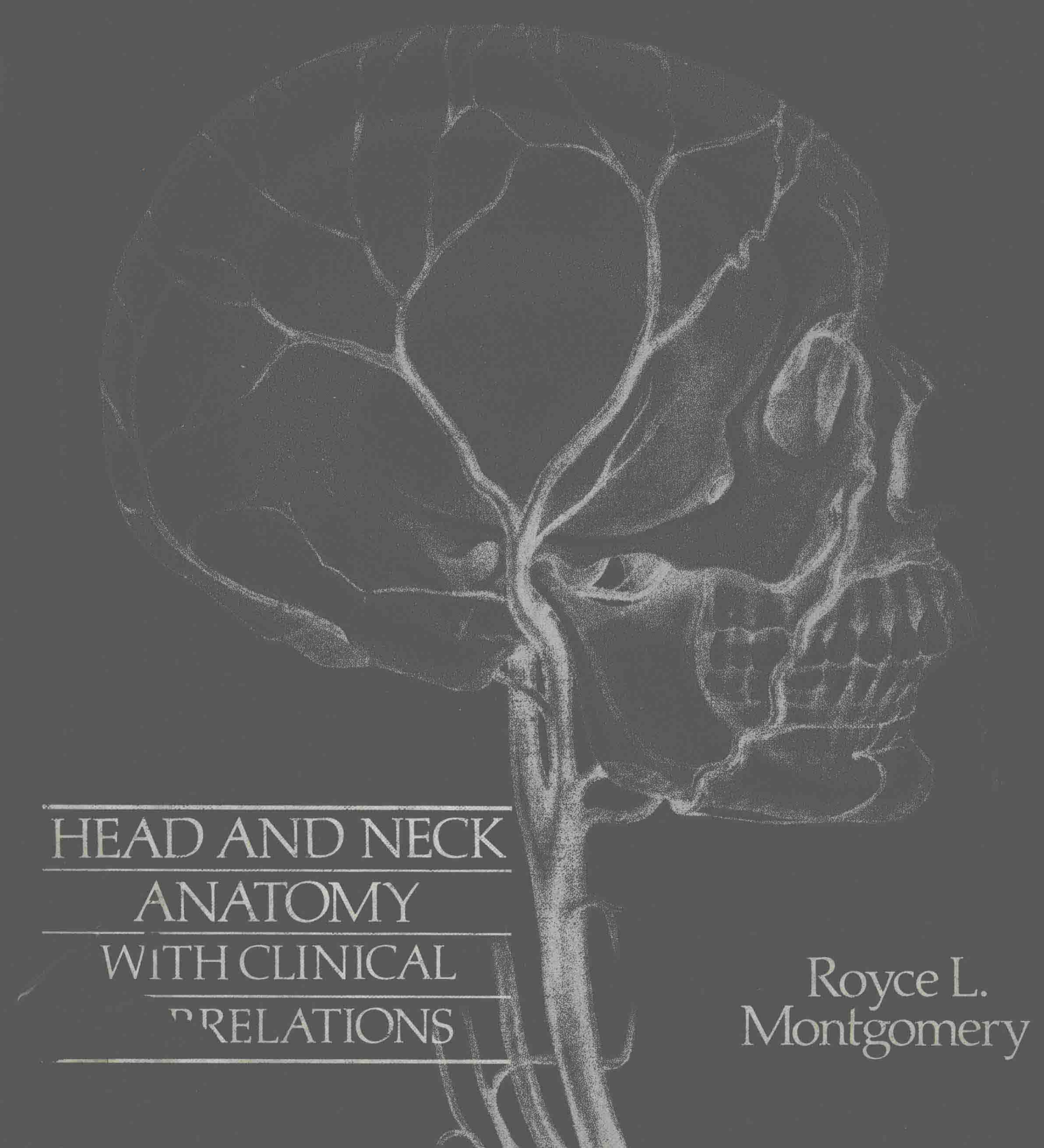

# HEAD AND NECK ANATOMY WITH CLINICAL RELATIONS

Royce L. Montgomery

# HEAD AND NECK ANATOMY WITH CLINICAL CORRELATIONS

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HEAD AND NECK ANATOMY:
WITH CLINICAL CORRELATIONS



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# HEAD AND NECK ANATOMY WITH CLINICAL CORRELATIONS

**To**

Sir Henry Morris
My predecessors and colleagues in the field of anatomy
My students, past, present, and future
My wife, Jane
My children, Todd, Scott, and Jill
My mother and father, Jimmie and E.L.

# PREFACE

My initial stimulus for writing this textbook was twofold. First, there are currently several excellent textbooks of human anatomy (Woodburne, Hollinshead, Grant, and Gardner-Gray-O'Rahilly) that provide medical students with the information needed in the medical school curriculum. None of the textbooks, however, were written specifically for the dental student and his or her curriculum. Second, *Morris' Human Anatomy* was recommended to me many years ago by my preceptor, Dr. Robert J. Johnson, and over the years I have learned to appreciate the textbook for its organization, clarity, and wealth of anatomical data. Unfortunately, in response to worldwide curricular revisions that have reduced the time allocated to anatomy, *Morris' Human Anatomy* is no longer being published. This is a tremendous loss to all members of the health profession (students and faculty) and to those who receive medical care. This is especially true for those individuals who have a sincere interest and keen desire to better understand the anatomy of the human body.

I obviously was delighted when approached by representatives of the McGraw-Hill Book Company and asked if I was interested in organizing material from *Morris' Human Anatomy* to be used in a head and neck anatomy textbook for dental students. This opportunity has allowed me to organize a textbook of anatomy designed specifically for the dental student and his or her curriculum, as well as introduce some of *Morris' Human Anatomy.*

I have made no attempt to change the flavor of the original material. The selection of material from *Morris' Human Anatomy* has been organized in a logical sequence, with clinical emphasis provided by clinical problems at the beginning of each chapter and solutions to the problems ending each chapter. Numerous descriptive illustrations focus on the anatomy being discussed.

I am indebted to Ms. Kathrinn Plemmons for typing numerous drafts of the manuscript and to Ms. Genice Chin for assisting in the labeling of illustrations. I am also greatly indebted to Mr. Robert Blake for preparing the illustrations, and to Dr. Ernest Small and Dr. Stephen Matteson for providing the clinical problems and solutions. Lastly, this work could not have been accomplished without the encouragement of the staff from McGraw-Hill Book Company.

Royce L. Montgomery

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# HEAD AND NECK ANATOMY WITH CLINICAL CORRELATIONS

# 1 INTRODUCTION

## CLINICAL PROBLEMS

*Problem 1* A typical case, readily brought to mind and seen all too frequently in the press, is that of the man, woman, or child at a social gathering choking on a bolus of food. Someone tries the Heimlich maneuver, but to no avail—it does not clear the airway! Rapidly the victim becomes cyanotic, and death is imminent.

Let us put this in a clinical setting. The patient in the dental office is receiving routine dental care. Some medication being used, a minimal amount, slips back in the oropharynx and down to the glottis. This patient may be hypersensitive to the medication, and vocal cords commence to become edematous. This slowly but most effectively closes the airway.

The patient becomes restless, anxious, distressed, frantic, and, once more, cyanotic. This time there is no foreign body to dislodge from the airway. This is laryngeal edema from the medication the dentist or hygienist used. Again, death is imminent.

Your knowledge of the topographic anatomy of the neck is now essential to saving these lives.

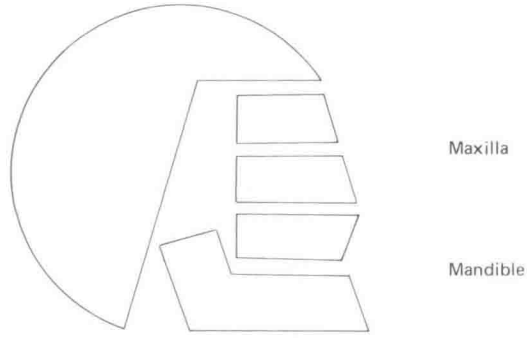
*Problem 2* Descriptive anatomical terms are used in the clinical evaluation of developmental abnormalities of the head and neck. Good examples are the terms used to describe deviations from normal in size and position of the jaws. Significant variations in the size of the maxilla and mandible can result in severe malocclusion, which can complicate dental treatment and require correction. Even when the jaws are normal in size, abnormal positions in relation to each other or to the skull can result in malocclusion; and both size and position abnormalities can result in aesthetic problems. The drawings and associated photographs in Figs. C1-1 to C1-6 illustrate the normal profile and several types of abnormality of jaw size. Notice, in Fig. C1-2, that in comparison with a jaw of normal size (Fig. C1-1), the maxilla is too long anteroposteriorly while the mandible is normal. In Fig. C1-3 the maxilla is too small while the mandible is normal. Figures C1-4 and C1-5 show the similar effects seen when the mandible is too small or too large. Note in Fig. C1-6 a condition known as *apertognathia*.

A lateral cephalometric radiograph of a normal patient is shown in Fig. C1-7. This type of film is used to determine the dimensions and interrelationships of the bones of the face and skull. Now compare the patients in Fig. C1-8 and C1-9 to the normal example (Fig. C1-1) and describe any differences in size and position of the maxilla and mandible.

*Problem 3* Still in the clinical arena, depart now from slow-moving *developmental* or growth problems in descriptive anatomy and consider the suddenly or accidentally acquired problem that focuses our thinking on *positional* anatomy.

A simple illustration of the importance of descriptive anatomical terms to the clinician might be the typical case of the young athlete who sustains a blow to the lower jaw and then finds that the teeth do not "meet right;" they cannot be closed into their usual bite.

Let us assume that the young man in Fig. C1-10 has a fracture of the mandible distal to the angle of the jaw. The pull of the attached muscles can move the fragments of fractured bones and have a direct bearing on the clinical management of the problem. Descriptive terms can communicate the solution to the problem. Is this, for instance, a favorable or an unfavorable horizontal fracture? Is it a favorable or an unfavorable vertical fracture?




*Problem 4* A 23-year-old patient was seen following a shooting incident. Frontal and lateral radiographs of the head were taken (Fig. C1-11). Identify and localize the foreign object.

*Problem 5* A 45-year-old man reported to the dentist with a chief complaint of repeated swelling in the floor of the mouth, especially noticeable after meals. Panorex and occlusal radiographs were obtained (Fig. C1-12). A panorex radiograph provides a straight-on view of the teeth and jaws. The occlusal radiograph is a view taken at right angles to the panorex and provides a view as if the floor of the mouth is seen from below. White, or radiopaque, areas on a radiograph represent dense structures such as bones or teeth, while black, or radiolucent, areas represent less dense structures such as soft tissues. How can the patient's symptoms be explained?

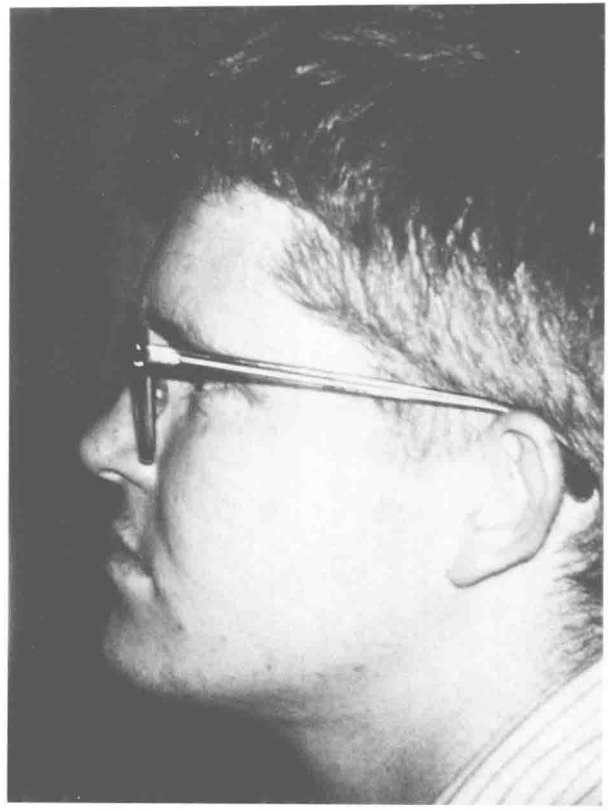
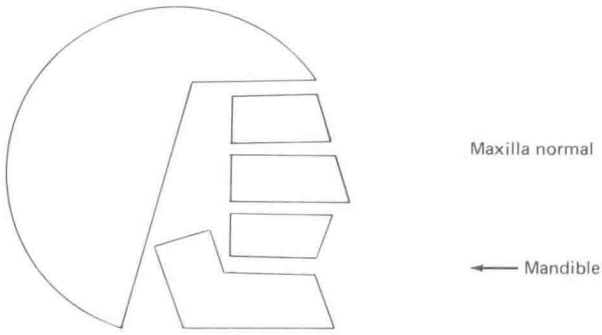


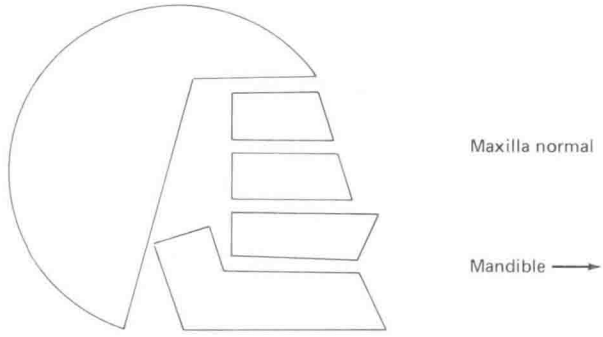
**Fig. C1-1 Normal profile.**



**Fig. C1-2 Prognathic maxilla.**

**Fig. C1-3 Retrognathic maxilla.**



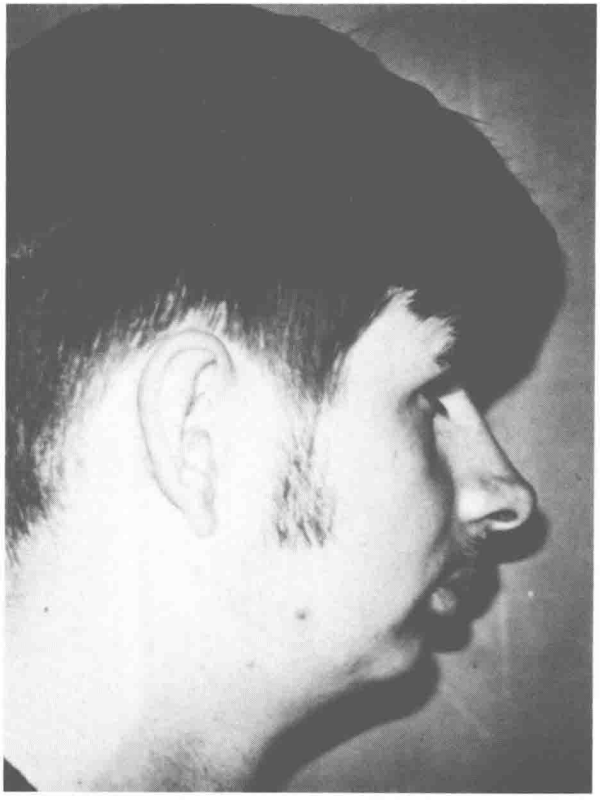
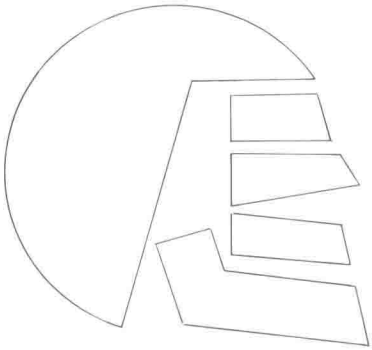



Fig. C1-4 Retrognathic mandible.

Fig. C1-5 Prognathic mandible.



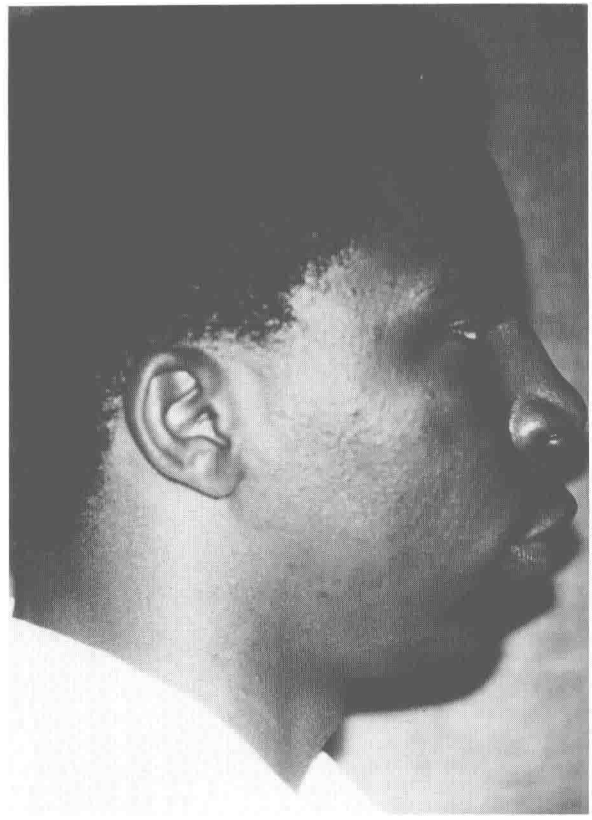



Fig. C1-6 Apertognathia.

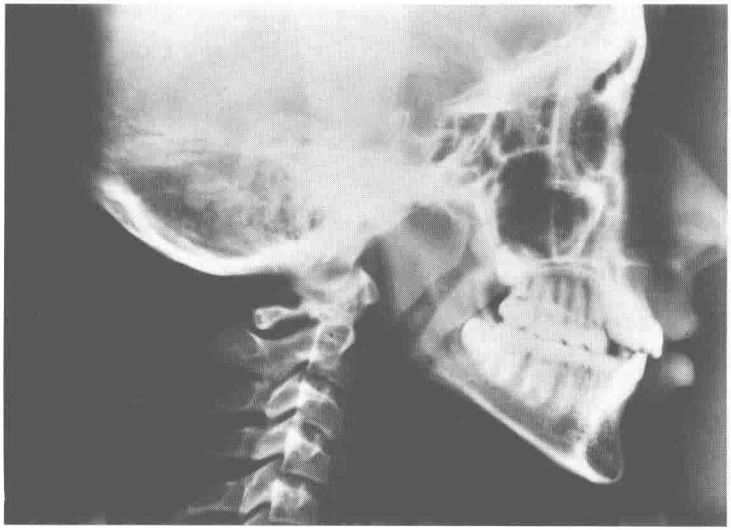


Fig. C1-7 Lateral cephalometric radiograph.

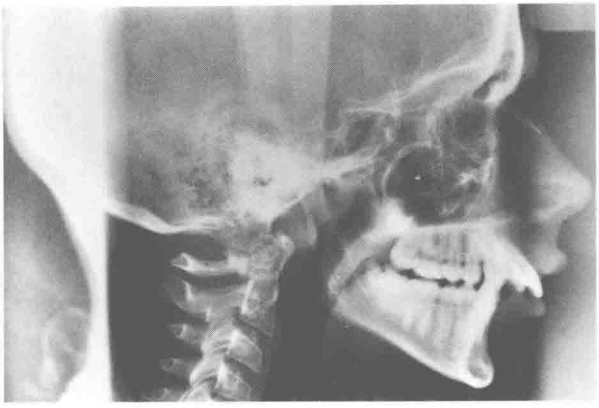
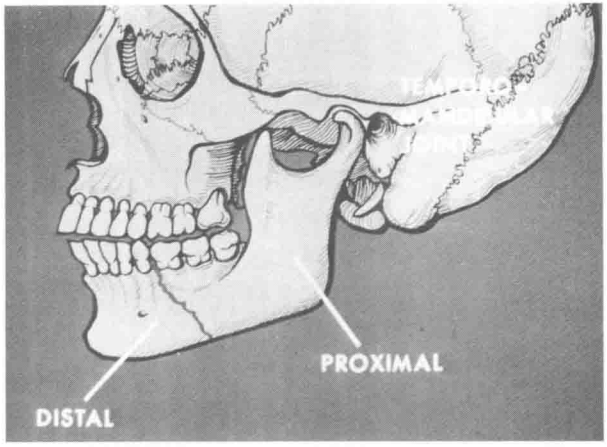


Fig. C1-8



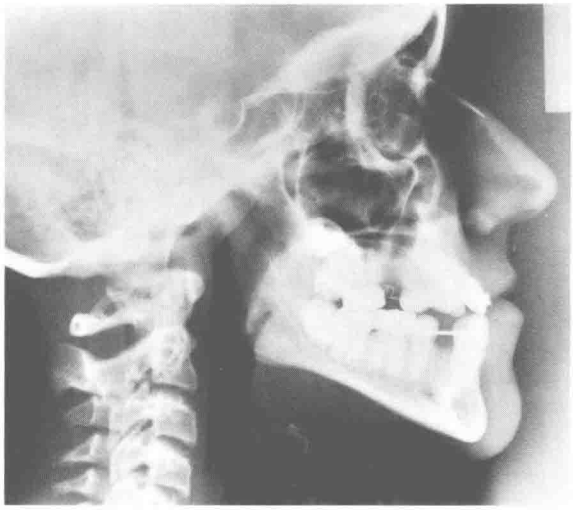



Fig. C1-9

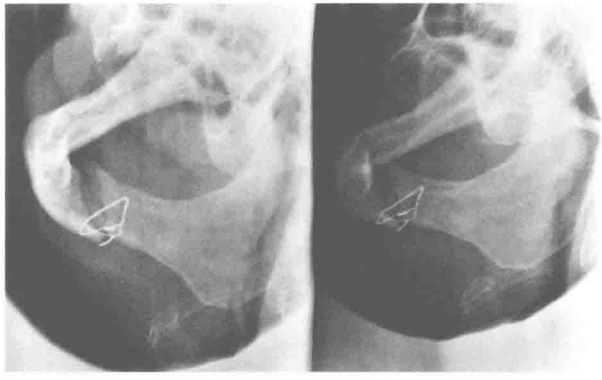
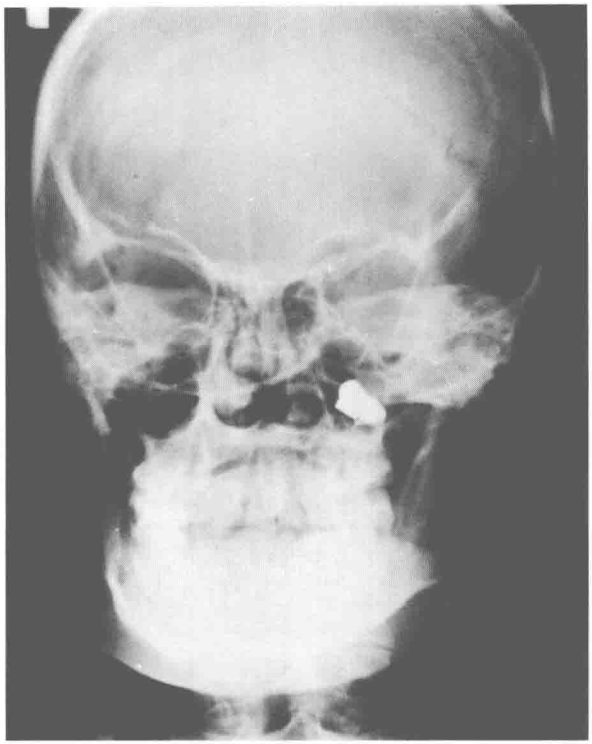


Fig. C1-10



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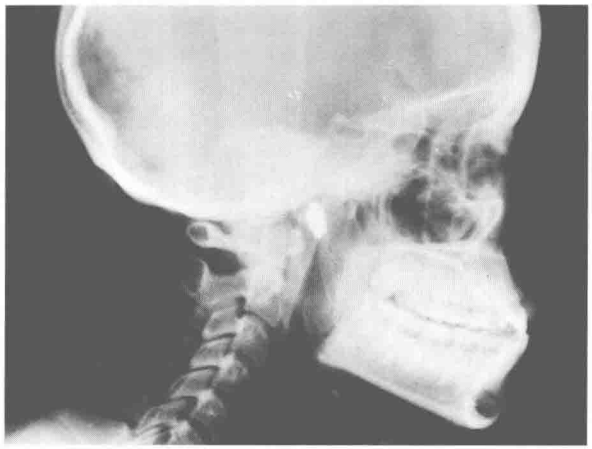
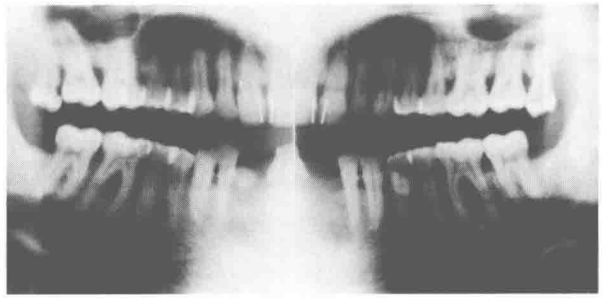


(*b*)

**Fig. C1-11** (*a*) Frontal and (*b*) lateral radiographs.



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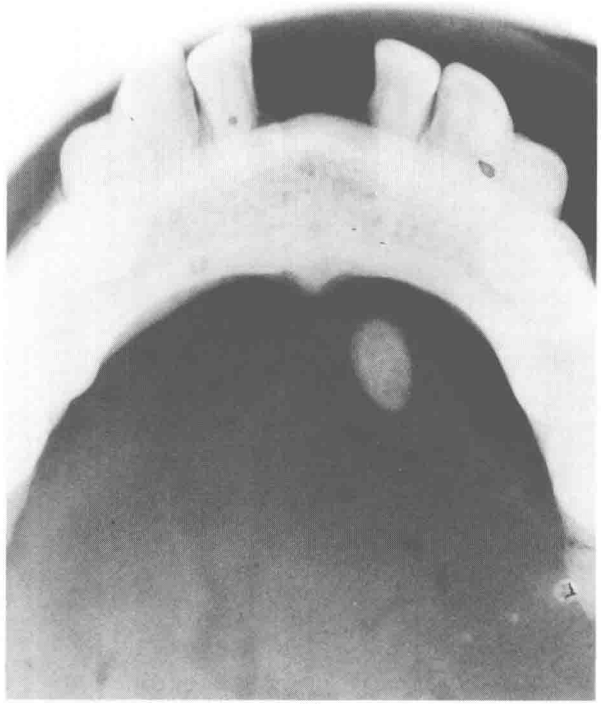

(*b*)

**Fig. C1-12** (*a*) Panorex and (*b*) occlusal radiographs.

## DEFINITION OF ANATOMY

Anatomy is the part of biological science that deals primarily with structure. The word *anatomy* is of Greek origin and originally meant to cut up or to cut repeatedly; the verb *dissect* is now used to mean the actual cutting up or taking apart of an organism for the purpose of studying its parts.

## SCOPE OF ANATOMY

The study of anatomy can be approached in several ways: by *systems*, by *regions*, or by a combination of the two that is called *practical* or *applied anatomy*. Students beginning the study of human anatomy will need to direct their efforts toward both the systemic and the regional approach and should do so with the assurance that such efforts will lead to practical application. A conscientious apportioning of time between dissection, with its regional approach, and textbook study of anatomic systems will yield the best return in knowledge acquired.

## TERMS OF POSITION, DIRECTION, AND RELATIONSHIP

Anatomic description requires the use of terms based on a certain orientation of the body. This is called the *anatomic position*, that of a person standing erect, with the arms hanging at the sides and the palms of the hands facing forward. Just as the spatial relationships of any object can be described by the use of three directions of orientation, those of the human body are indicated by sagittal, frontal, and transverse planes. These are defined as follows (Fig. 1-1):

**Sagittal** a vertical plane which lies in the anteroposterior direction. There is one middle or *midsagittal* plane, which divides the body into right and left halves.

**Frontal (coronal)** a vertical plane which passes from side to side, in a lateromedial or mediolateral direction.

**Transverse** a horizontal plane which determines the directions of cross sections of the body.

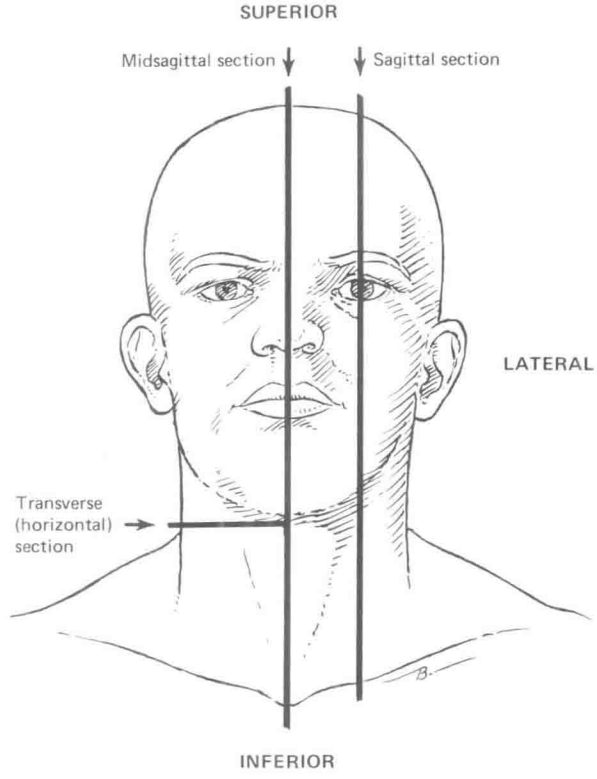


**Fig. 1-1 Terms of position, direction, and relationship.**

Each of the planes makes an angle of 90° with respect to the other two.

Directions are indicated by the following terms:

**Anterior (ventral)** toward the front of the body

**Posterior (dorsal)** toward the back of the body

**Lateral** toward the side of the body, or away from the midsagittal plane

**Medial** toward the midsagittal plane

*External* and *internal* have their usual meaning: e.g., skin is external to musculature, and a muscle lies external to a bone. *Superficial* and *deep* are used similarly: a superficial structure is one relatively near the outside of the body, and a deep one is internally located.