
10. ORAL AND MAXILLOFACIAL SURGERY

Stephen T. Sonis, D.M.D., D.M.Sc., and Willie L. Stephens, D.D.S.

General Topics

1. What are the elements of a SOAP note used for patient assessment?

- S = Symptoms
- O = Objective findings
- A = Assessment
- P = Plan

2. Why should a patient be hospitalized for routine oral surgical procedures?

The most common reason for hospitalizing a patient for routine oral surgical procedures is behavioral management. Patients who are severely handicapped, for example, may not be able to tolerate care in an office setting. Patients who are at high medical risk are often best treated in the controlled environment of the operating room, where constant monitoring and quick treatment of a problem are more easily managed. The final reason for treating a patient in the operating room is an inability to tolerate or obtain local anesthesia.

3. What are the basic technical considerations in performing an incision?

- Use a sharp blade of appropriate size.
- A firm, continuous stroke is preferable to short, soft, repeated strokes.
- Avoid vital structures; incising the lingual artery can ruin your morning.
- Use incisions that are perpendicular to epithelial surfaces.
- Consider the anatomy of the site in placement of the incision.

4. What factors influence the placement of incisions in the mouth?

- Anatomy and location of vital structures
- Convenience and access

5. For making an incision in an epithelial surface, how should the scalpel blade be oriented?

To avoid bias, the incision should be made perpendicular to the epithelial surface.

6. What are the principles of flap design?

- Flap design should ensure adequate blood supply; the base of the flap should be larger than the apex.
- Reflection of the flap should adequately expose the operative field.
- Flap design should permit atraumatic closure of the wound.

7. What are the most frequent causes of the tearing of mucogingival flaps?

1. Flaps are too small to provide adequate exposure.
2. Too much force is used to elevate the flaps.

8. What are the means of promoting hemostasis?

- Pressure Ligation with sutures
- Thermal coagulation Use of vasoconstrictive substances

9. Describe and discuss the function of Allis forceps in oral surgery.

Allis forceps have a locking handle similar to a needle holder and small beaks at the working end of the instruments. These beaks are useful in grasping tissue for removal.

10. What are the indications for tooth transplantation? Which teeth are most often transplanted?

Severe caries of the first molar is the most common indication for tooth transplantation. The first molar is atraumatically removed, and the third molar is placed into the socket. Success of the transplant is most predictable when the apices of the roots of the tooth to be transplanted are one-third to one-half formed with open apices and the bordering bony plates are intact.

11. What is genioplasty?

Genioplasty is a procedure by which the position of the chin is surgically altered. The most common techniques are osteotomy or augmentation with natural or synthetic materials.

12. How are facial and palatal clefts classified?

- | | |
|-----------|----------------------------|
| Class I | Cleft lip only |
| Class II | Cleft lip and cleft palate |
| Class III | Cleft palate only |
| Class IV | Facial cleft |

13. What is the role of the general dentist in managing oral cancer?

The general dentist has three major roles in managing oral cancer:

1. Perhaps the most important is detection. As the primary provider of oral health care, the dentist is in the position to detect the presence of early lesions. A high degree of suspicion should lead to aggressive evaluation of any abnormality

of the oral soft tissues. Biopsy of most areas of the mouth is within the realm of the generalist.

2. Once a diagnosis of oral cancer has been established, the dentist has the responsibility of ensuring that there are no areas of latent oral infection that may predispose to the development of osteoradionecrosis or other complications of therapy.

3. Because xerostomia and subsequent caries are common among patients receiving radiation therapy to the head and neck, the generalist should educate the patient about factors and behavior that increase the risk and should provide the patient with trays for the self application of fluoride gels. An aggressive recall schedule should be established.

14. What are the optimal dimensions (ratio) for an elliptical incisional biopsy?

To ensure adequate margins for an incisional biopsy of an elliptical lesion, the length of the ellipse should be 3 times the width.

Golden DP, Hooley JR: Oral mucosal biopsy procedures—Excisional and incisional. Dent Clin North Am 38:279—300, 1994.

15. What are the major oral side effects of radiation to the head and neck?

Xerostomia
Mucositis

Caries
Osteoradionecrosis

SUTURES: TECHNIQUES AND TYPES

16. What is the most common suture method? What are its advantages?

The interrupted suture is the most common method. Because each suture is independent, this procedure offers strength and flexibility in placement. Even if one suture is lost or loosens, the integrity of the remaining sutures is not compromised. The major disadvantage is the time required for placement.

17. What are the advantages of a continuous suture?

- Ease and speed of placement
- Distribution of tension over the whole suture line
- A more watertight closure than interrupted sutures

18. What factors determine the type of suture to be used?

Tissue type Healing process
Wound condition Expected postoperative course

19. How are sutures sized?

Size refers to the diameter of the suture material. The smallest size that provides the desired wound tension should be used. The higher the number, the smaller the suture. For example, 3-0 sutures are thicker than 4-0 sutures. The larger the diameter, the stronger the suture. In general, sutures for intraoral wound closure are 3-0 or 4-0.

20. What are the types of resorbable sutures? Nonresorbable sutures?

Resorbable	Nonresorbable
Plain gut	Silk
Chromic gut	Synthetic
Synthetic	Nylon
Vicryl	Mersilene
Dexon	Prolene

21. What is the difference between monofilament and polyfilament sutures?

Monofilament sutures consist of material made from a single strand. They resist infection by not harboring organisms. Plain and chromic gut are examples. Polyfilament sutures are made of multiple fibers that are either braided or twisted. They generally have good handling properties. The most common examples used in oral surgery are silk, Dexon, and Vicryl.

22. What are the principles of suturing technique?

- The suture should be grasped with the needle holder three-fourths of the distance from the tip.
- The needle should be perpendicular when it enters the tissue.
- The needle should be passed through the tissue to coincide with the shape of the needle.
- Sutures should be placed at an equal distance from the wound margin (2—3 mm) and at equal depths.
- Sutures should be placed from mobile tissue to fixed tissue.
- Sutures should be placed from thin tissue to thick tissue.
- Sutures should not be overtightened.
- Tissues should not be closed under tension.
- Sutures should be 2—3 mm apart.
- The suture knot should be on the side of the wound.

23. When should intraoral sutures be removed?

In uncomplicated cases, sutures generally may be removed 5—7 days after placement.

TOOTH EXTRACTION

24. What are the components of extraction forceps?

Handle, hinge, and beaks.

25. What are the three principles of exodontia according to Shira?

1. Obtain adequate access.
2. Create an unimpeded path of removal.
3. Use controlled force.

26. What forceps are typically used for the removal of maxillary teeth?

Single-rooted teeth are usually removed with a maxillary universal forceps (150) or a no. 1 forceps. Premolars can be extracted with the maxillary universal forceps. To extract maxillary

Synthetic
Nylon
Mersilene
Prolene

molars, 150 forceps usually can be used. Alternatively, the upper molar cowhorn can be used for fractured or carious teeth if care is applied.

27. What forceps are typically used for the removal of mandibular teeth?

Ashe forceps are generally the most effective for the removal of mandibular incisors, canines, and premolars. A lower universal forceps (151) is an alternative. The 151 also can be used for most molars, although a mandibular cowhorn forceps (no. 23) and no. 17 forceps are alternatives.

28. Name the indications for tooth extraction.

- Severe caries resulting in a nonrestorable tooth
- Pulpal necrosis that is not treatable with endodontic therapy
- Advanced periodontal disease resulting in severe, irreversible mobility
- Malpositioned, nonfunctional teeth
- Cracked or fractured teeth that are not amenable to conservative therapy
- Prosthetic considerations
- Impacted teeth when indicated (not all impacted teeth require extraction)
- Supernumerary teeth
- Teeth associated with a pathologic lesion, such as a tumor, that cannot be eliminated completely without sacrificing the tooth
 - Before severe myelosuppressive cancer therapy or radiation therapy, any tooth that has a questionable prognosis or may be a potential source of infection should be extracted.
- Teeth involved in jaw fractures

29. What are the major contraindications for tooth extraction?

Contraindications may be either systemic or local. Systemic contraindications are related to the patient's overall health and may include the presence of a coagulopathy; uncontrolled diabetes mellitus; hematologic malignancy, such as leukemia; uncontrolled cardiac disease; and certain drug therapy. Elective extractions in pregnant patients is contraindicated. Local factors include radiation therapy to the area, active infection, and nonlocalized infection. The presence of a localized, dentoalveolar abscess is not an arbitrary contraindication for extraction.

30. Give reasons for extracting third molars in a teenaged patient rather than waiting until the patient is in his or her 40s.

Younger patients have a follicle surrounding the crown, whereas this space is occupied by dense bone in older patients. Similarly, the periodontal ligament space is more prominent in younger patients. Finally, whereas the roots are likely to be incompletely formed in younger patients, they are completely formed in older patients and may add to the complexity of extraction.

31. What factors affect the difficulty associated with tooth extraction?

- Position of the tooth in the arch. In general, anterior teeth are more easily extracted than posterior teeth. Maxillary teeth are less difficult than mandibular teeth.
- Condition of the crown. Carious teeth may be easily fractured, thus complicating the extraction.
- Mobility of the tooth. Teeth that are mobile as a consequence of periodontal disease are more easily extracted. Ankylosis or hypercementosis increases the difficulty of tooth removal. In assessing mobility, the operator needs to ensure that the crown is not fractured; fracture may produce a false sense of overall tooth mobility.
 - Root shape and length
 - Proximity of associated vital structure
 - Patient attitude and general health

32. What conditions may influence the difficulty of extraction of an erupted tooth?

- Root form
- Hypercementosis
- Internal or external root resorption
- Caries
- Prior endodontic therapy

33. How are cases classified according to their difficulty?

- Type 1: Easy patient, easy case
- Type 2: Easy patient, difficult case
- Type 3: Difficult patient, easy case
- Type 4: Difficult patient, difficult case

34. What are the major forces used for tooth extraction?

Rotation and luxation are the major forces used for tooth extraction.

35. For multiple extractions, what is the appropriate order of tooth removal?

In general, maxillary teeth are removed before mandibular teeth and posterior teeth before anterior teeth.

36. What principles guide the use of elevators in tooth extraction?

- Elevators may be used to assess the level of anesthesia and to release the periodontal ligament.
- The bone, not adjacent teeth, should be used as the fulcrum for elevator assistance in tooth extraction.
- Elevators are most useful in multiple extractions.
- Elevators may assist in the removal of root tips by using a wedge technique.

37. What are the steps in postoperative management of an extraction site?

1. Irrigate the site with sterile saline.
2. Remove tissue tags and granulation tissue from the soft tissue of the site.
3. Aggressive curettage of the socket is contraindicated. Pathologic tissue should be removed by gentle scraping of the socket.
4. Compress the alveolar bone with finger pressure.
5. Suture if necessary at the papillae bordering the extraction site and across the middle of the site.
6. Review postoperative instructions with the patient.

38. What are the indications for third-molar extraction?

Pericoronitis

- Nonrestorable caries
- Advanced periodontal disease
- Position that prohibits adequate home care of the third molar or compromises maintenance of the second molar
- Cyst formation
- Malposition
- Chronic pain
- Association with a neoplasm
- Resorption of adjacent tooth

39. Should all impacted third molars be extracted?

No. Fully impacted third molars that do not communicate with the oral cavity need not be extracted. The teeth should be followed regularly, however, to ensure

that no pathologic process develops. No data support the suggestion that impacted third molars contribute to crowding of anterior teeth.

40. What are the major complications of tooth extraction?

Fracture of the root or alveolar plate	Infection
Displacement of a root tip	Perforation of the maxillary sinus
Bleeding	Paresthesia
Dry socket (localized osteitis)	Soft-tissue injury
Fracture of the tuberosity	

41. What is the most common complication of tooth extraction? How can it be prevented?

The most common complication of tooth extraction is root fracture. The best method of prevention is to expose the tooth surgically and to remove bone before extraction.

42. Which tooth root is most likely to be displaced into an unfavorable anatomic site during extraction?

The palatal root of the maxillary first molar is most likely to be displaced into the maxillary sinus during extraction.

43. Describe the prevention and treatment of postoperative bleeding.

A thorough preoperative medical history helps to identify most patients at systemic risk for postoperative bleeding. On leaving the office, patients should receive both verbal and written instructions for postoperative wound care. Of particular relevance regarding bleeding is the avoidance of rinsing, spitting, and smoking during the first postoperative day. The patient should be specifically instructed to avoid aspirin. Patients should be instructed to bite on a gauze sponge for 30 minutes after the extraction.

A patient with postoperative bleeding should return to the office. The wound should be cleared of residual clot or debris, and the source of the bleeding identified. Local anesthesia should be administered, and existing sutures removed. The wound should be irrigated copiously with saline. Residual granulation tissue should be removed. A hemostatic agent, such as gelatin sponge, oxidized cellulose, or oxidized regenerated cellulose, may be placed into the extraction site. The wound margins should be reapproximated and carefully sutured.

44. What is a dry socket?

Dry socket is a localized osteitis of the extraction site that typically develops between the third and fourth postoperative day. The term applies to the clinical appearance of the socket, which is devoid of a typical clot or granulating wound. Consequently, patients develop moderate-to-severe throbbing pain. The frequency of dry socket after routine tooth extractions is around 2%. However, the condition

may occur in as many as 20% of cases after extraction of impacted mandibular third molars.

45. How can dry socket be prevented?

Prevention of dry socket is somewhat controversial. It is generally agreed that careful technique to minimize trauma reduces the likelihood of this complication. In addition, preoperative rinsing with chlorhexidine gluconate 0.12% may be of benefit. Placement of antibiotic-impregnated gelfoam or injection of polylactic acid granules into the socket before suturing may be of value, although these interventions are far from being universally accepted.

46. How is dry socket treated?

Curettage of the extraction site is contraindicated. The extraction site should be gently irrigated with warm saline. A medicated dressing is then placed into the socket. The medication used for this purpose has been the topic of much discussion. One alternative consists of eugenol, benzocaine, and balsam of Peru. Alternatively, a gauze dressing impregnated with equal amounts of zinc oxide, eugenol, tetracycline, and benzocaine may be used.

47. What substances should never be placed into a healing socket?

Petrolatum-based compounds and tetracycline powder.

48. Describe pain control after extraction.

For most patients, adequate control of postoperative pain is obtained with nonsteroidal antiinflammatory drugs (NSAIDs). A large number of compounds are available. Data indicate that postoperative pain can be minimized if the first dose of NSAIDs is administered immediately after the procedure. No evidence indicates that preoperative administration of NSAIDs favorably alters the postoperative course. For patients unable to take NSAIDs because of allergies, ulcer disease, or other contraindications, various narcotic analgesics are available. Patients taking such medications must be cautioned about drowsiness and concurrent use of alcohol or other medication. In no instance is persistent postoperative pain (>2 days) to be expected, and patients should be instructed to call if they have prolonged discomfort, which may indicate infection or another complication.

49. What percent of patients request pain medication after third-molar removal?

90%.

50. Which teeth are most commonly impacted?

The most commonly impacted teeth are the third molars and the maxillary canines.

INFECTIONS AND ABSCESSSES

51. What are the major sources of odontogenic infections?

The two major sources of odontogenic infection are periapical disease, which occurs as a consequence of pulpal necrosis, and periodontal disease.

52. What are the three clinical stages of odontogenic infection?

1. Periapical osteitis occurs when the infection is localized within the alveolar bone. Although the tooth is sensitive to percussion and often slightly extruded, there is no soft tissue swelling.

2. Cellulitis develops as the infection spreads from the bone to the adjacent soft tissue. Subsequently, inflammation and edema occur, and the patient develops a poorly localized swelling. On palpation the area is often sensitive, but the sensitivity is not discrete.

3. Suppuration then occurs and the infection localizes into a discrete, fluctuant abscess.

53. What are the significant complications of untreated odontogenic infection?

- Tooth loss
- Spread to the cavernous sinus and brain
- Spread to the neck with large vein complications
- Spread to potential fascial spaces with compromise of the airway
- Septic shock

54. What are the principles of therapy for odontogenic infections as defined by Peterson?

1. Determine the severity of the infection.
2. Evaluate the state of the host defense mechanisms.
3. Determine whether the patient should be treated by a general dentist or a specialist.
4. Treat the infection surgically.
5. Support the patient medically.
6. Choose and prescribe the appropriate antibiotic.
7. Administer the antibiotic properly.
8. Evaluate the patient frequently.

55. What is the treatment of choice for an odontogenic abscess?

The treatment of choice for an odontogenic abscess is incision and drainage, which may be accomplished in one of three ways: (1) exposure of the pulp chamber with extirpation of the pulp, (2) extraction of the tooth, or (3) incision into the soft-tissue surface of the abscess. Antibiotic therapy is indicated in the presence of fever or lymphadenopathy.

56. How is incision and drainage of soft tissue best performed?

Local anesthesia should be obtained first. Care must be taken not to inject through the infected area and thus spread the infection to noninvolved sites. Once adequate anesthesia has been obtained, an incision should be placed at the most dependent part of the swelling. The incision should be wide enough to facilitate drainage. Blunt dissection is often helpful. After irrigation, a drain of either iodoform gauze or rubber should be placed to maintain the patency of the wound. Postoperative instructions should include frequent rinses with warm saline, appropriate pain medication, and, when indicated, antibiotic therapy. The patient should be instructed to return for follow-up evaluation in 24 hours.

57. When infection erodes through the cortical plate, it does so in a predictable manner. What factors determine the location of infection from a specific tooth?

- Thickness of bone overlying the tooth apex; the thinner the bone, the more likely it is to be perforated by spreading infection.
- The relationship of the site of bony perforation to muscle attachments to the maxilla or mandible.

58. State the usual site of bone perforation, the relationship to muscle attachment, the determining muscle, and the site of localization for each tooth for odontogenic infections.

<i>Involved Teeth</i>	<i>Usual Site of Peiforation of Bone</i>	<i>Relation of Perforation to Muscle Attachment</i>	<i>Determining Muscle</i>	<i>Site of Localization</i>
maxilla				
Central incisor	Labial	Below	Orbicularis oris	Labial vestibule
Lateral incisor	Labial	Below	Orbicularis oris	Labial vestibule
	(palatal)*	-	-	(palatal)
Canine	Labial	Below	Levator anguli oris	Oral vestibule
	Labial	(above)	Levator anguli oris	(Canine space)
Premolars	Buccal	Below	Buccinator	Buccal vestibule
Molars	Buccal	Below	Buccinator	Buccal vestibule
	Buccal	Above	Buccinator	Buccal space
	(palatal)	-	-	(palatal)
Mandible				
Incisors	Labial	Above	Mentalis	Labial vestibule
Canine	Labial	Above	Depressor anguli oris	Labial vestibule
Premolars	Buccal	Above	Buccinator	Buccal vestibule
First molar	Buccal	Above	Buccinator	Buccal vestibule
	Buccal	Below	Buccinator	Buccal space
	Lingual	Above	Mylohyoid	Sublingual space
Second molar	Buccal	Above	Buccinator	Buccal vestibule
	Buccal	Below	Buccinator	Buccal space
	Lingual	Below	Mylohyoid	Sublingual space
	Lingual	Below	Mylohyoid	Submandibualr space
Third molar	Lingual	Below	Mylohyoid	Submandibualr space

* Parentheses indicate rare occurrences.

Modified from Laskin DM: Anatomic considerations in diagnosis and treatment of odontogenic infections. J Am Dent Assoc 69:308, 1964.

59. What is osteoradionecrosis?

Osteoradionecrosis is a chronic infection of bone that occurs after radiation therapy. It is most commonly noted in the mandible of patients who receive treatment for head and neck cancer and have preexisting dental infection. Thus, the frequency is higher in dentulous patients compared with edentulous patients. Prevention of osteoradionecrosis involves the elimination of infected teeth before initiation of radiation therapy. The patient who receives radiation to the head and neck remains at risk for osteoradionecrosis.

60. What are the indications for hospitalization of patients with infection?

Fever > 101°F	Leukocytosis (WBC > 10,000)
Dehydration	Shift of WBC to the left (increased immature neutrophils)
Trismus	Systemic disease known to modify the patient's ability to fight infection
Marked pain	Need for parenteral antibiotics
Significant and/or spreading swelling	Inability of patient to comply with traditional treatment
Elevation of the tongue	Need for extraoral drainage
Bilateral submandibular swelling	
Neurologic changes	
Difficulty with breathing or swallowing	

61. What are the indications for antibiotic therapy in orofacial infection?

- Evidence of systemic involvement, such as fever, leukocytosis, malaise, fatigue, weakness, lymphadenopathy, or increased pulse
- Infection that is not localized but extending or progressing
- No response to standard surgical intervention
- Increased risk for endocarditis or systemic infection because of cardiac status, immune status, or systemic disease

62. What are fascial space infections?

Fascial spaces potentially exist between fascial layers and may become filled with purulent material from spreading orofacial infections. Spaces that become directly involved are termed spaces of primary involvement. Infections may spread to additional spaces, which are termed secondary.

63. What are the primary maxillary fascial spaces?

Canine, buccal, and infratemporal.

64. What are the primary mandibular fascial spaces?

Submental, submandibular, buccal, and sublingual.

65. What are the secondary fascial spaces?

Masseteric	Lateral pharyngeal
Pterygomandibular	Retropharyngeal
Superficial and deep temporal	Prevertebral

66. What is Ludwig's angina?

Ludwig's angina is bilateral cellulitis affecting the submandibular and sublingual spaces. Patients develop marked brawny edema with elevation of the floor of the mouth and tongue that results in airway compromise.

67. What is cavernous sinus thrombosis?

Cavernous sinus thrombosis may occur as a consequence of the hematogenous spread of maxillary odontogenic infection via the venous drainage of the maxilla. The lack of valves in the facial veins permits organisms to flow to and contaminate the cavernous sinus, thus resulting in thrombosis. Patients present with proptosis, orbital swelling, neurologic signs, and fever. The infection is life-threatening and requires prompt and aggressive treatment, consisting of elimination of the source of infection, drainage, parenteral antibiotic therapy, and neurosurgical consultation.

68. What is the antibiotic of choice for odontogenic infection?

Penicillin is the drug of choice; 95% of bacteria causing odontogenic infections respond to penicillin. For most infections, a dose of penicillin VK, 500 mg every 6 hours for 7–10 days, is adequate; 5–7% of the population, however, is allergic to penicillin.

69. What are alternative antibiotics for patients who are allergic to penicillin?

Erythromycin, clindamycin, and tetracycline.

70. Despite the advent of numerous new antibiotics, penicillin remains the drug of choice for odontogenic infections. Why?

- It is bactericidal with a narrow spectrum of activity that includes the most common pathogens associated with odontogenic infection.
- It is safe; the toxicity associated with penicillin is low.
- It is cheap. A 10-day supply of penicillin cost under \$5, compared, for example, with Augmentin, which costs the patient approximately \$70.

71. What is the major side effect associated with erythromycin?

Stomach upset and cramping are common after ingestion of erythromycin. Such side effects may be minimized by prescribing an enteric-coated formulation,

by having the patient eat with the medication, or by prescribing a form of erythromycin that is absorbed from the intestine rather than the stomach.

72. What factors govern the selection of a particular antibiotic?

Specificity	Cost
Toxicity	Ease of administration

73. When should cultures be used for odontogenic infection?

- Infection in patients with immunocompromise due, for example, to cancer chemotherapy, diabetes mellitus, or immunosuppressive drugs
- Before changing antibiotics in a patient who has failed to respond to empirical therapy
- Before initiating antibiotic therapy in a patient who demonstrates signs of systemic infection

74. Why may antibiotic therapy fail?

- Lack of patient compliance
- Failure to treat the infection locally
- Inadequate dose or length of therapy
- Selection of wrong antibiotic
- Presence of resistant organisms
- Nonbacterial infection
- Failure of antibiotic to reach infected site
- Inadequate absorption of antibiotic, as when tetracycline is taken with milk products

75. Why is phenoxymethyl penicillin (penicillin V) more desirable than benzyl penicillin (penicillin G) for the treatment of odontogenic infections?

Penicillin V has the same spectrum of activity as penicillin G but is not broken down by gastric acid. It is absorbed well orally.

76. Does the initiation of antibiotic therapy obviate the need for surgical intervention in a patient with an infection?

No. Failure to eliminate the source of infection through surgical intervention ultimately results in the failure of other forms of therapy.

DENTAL TRAUMA

77. What are the most important questions to ask in evaluating a patient with acute trauma?

1. How did the injury occur?
2. Where did the injury occur?
3. When did the injury occur?

4. Was the patient unconscious, or did the patient have nausea, vomiting, or headache?

5. Was there prior injury to the teeth?

6. Is there any change in the occlusion?

7. Is there any thermal sensitivity of the teeth?

8. Review of the medical history

Andreasen JO, Andreasen FM: Essentials of Traumatic Injuries to the Teeth. Copenhagen, Munksgaard, 1990.

78. Discuss the primary assessment and management of the patient with trauma.

The initial assessment and management of the patient with trauma are centered on identification of life-threatening problems. The three most significant aspects are (1) establishing and maintaining an airway, (2) evaluation and support of the cardiopulmonary system, and (3) control of external hemorrhage. The patient should be assessed and treated for shock.

79. What are the diagnostic methods of choice for evaluation of the pediatric patient with trauma?

History and physical examination are the mainstays in evaluating the pediatric patient with trauma. The clinician should determine the cause of the trauma, the type of injury and the direction from which it occurred. In the case of a younger child, it is helpful if an adult witnessed the traumatic event. Physical examination should determine the child's mental state, facial asymmetry, trismus, occlusion, and vision. The radiographic evaluation of choice is computed tomography.

Kaban L: Diagnosis and treatment of fractures of facial bones in children. J Oral Maxillofac Surg 51:722—729, 1993.

80. What are the four best ways for a patient to preserve a recently avulsed tooth until he or she is seen by a dentist?

The four best ways for a patient to preserve a recently avulsed tooth are (1) to replace it immediately into the socket from which it was avulsed; (2) to place it in the mouth, under the tongue; (3) to place the tooth in milk; or (4) to place the tooth in saline (1 teaspoon of salt in a glass of water).

81. How should an avulsed tooth be managed?

1. Whenever possible, avulsed teeth should be replaced into the socket within 30 minutes of avulsion. After 2 hours, associated complications such as root resorption increase significantly.

2. The tooth should not be scraped or extensively cleaned or sterilized because such procedures will damage the periodontal tissues and cementum. The tooth should be gently rinsed with saliva only.

3. The tooth should be placed in the socket with a semirigid splint for 7—14 days.

Inflammatory external and internal resorption occurs when necrotic pulp has become infected, leading to resorption of the external surface of the root or the pulp chamber and/or canal. Immediate treatment with a calcium pulpectomy is indicated to arrest the process. **Replacement resorption** occurs after damage to the periodontal ligament results in contact of cementum with bone. As the root cementum is resorbed, it is replaced by bone, resulting in ankylosis of the involved tooth.

85. When can the above forms of resorption be detected radiographically?

It is possible to detect periapical radiolucencies that indicate internal and external resorption after 3 weeks. Replacement resorption may be detected after 6 weeks.

86. Why should radiographs of the soft tissue be included in evaluation of a patient with dental trauma?

It is not uncommon for fragments of fractured teeth to puncture and imbed themselves into the oral soft tissue. Clinical examination is often inadequate to detect these foreign bodies.

87. When a lip laceration is encountered, what part of the lip is the most important landmark and the first area to be reapproximated?

The vermilion border, the area of transition of mucosal tissue to skin, is evaluated and approximated first. An irregular vermilion margin is unesthetic and difficult to correct secondarily.

88. How should a small avulsion of the lip be managed?

Avulsions can be treated with primary closure if no more than one-fourth of the lip is lost. The tissue margins should be excised so that the wound has smooth, regular margins.

89. How should a full-thickness, mucosa-to-skin laceration of the lip be closed? Which layers should be sutured?

A layer closure ensures an optimal cosmetic and functional results. First a 5-0 nylon suture is placed at the vermilion border. The muscle layer, the subcutaneous layer, and the mucosa layer are closed with 4-0 resorbable sutures; then the skin layer is closed with a 5-0 or 6-0 nylon suture.

90. How should a facial laceration that extends into dermis or fat be closed?

Wounds that extend into dermis or fat should be closed in layers. The dermis should be closed with 4-0 absorbable sutures, the skin with 5-0 or 6-0 nonabsorbable sutures.

91. Why is a layered closure important?

A layered wound closure reestablishes anatomic alignment and avoids dead space, thus reducing the risk of infection and scar formation. Closure of the muscle and subcutaneous tissue layers minimizes tension in the skin layer and thus allows eversion of the skin edges, which results in the most esthetic scar.

92. What structures are at risk when a facial laceration occurs posterior to the anterior margin of the masseter muscle and inferior to the level of the zygomatic arch?

The buccal branch of the facial nerve and the parotid gland duct are at risk with lacerations in this position. When such a laceration is encountered, facial nerve function must be tested, along with salivary flow from the parotid duct.

93. What is a dentoalveolar fracture? How is it treated?

A dentoalveolar fracture is a fracture of a segment of the alveolus and the tooth within that segment. This fracture usually occurs in anterior regions. Treatment consists of reduction of the segment to its original position or best position relative to the opposing dentition, because it may not be possible to determine the exact position before injury. The segment is then stabilized with a rigid splint for 4—6 weeks.

94. What is the modified Le Fort classification of fractures?

Le Fort I	Low maxillary fracture
Ia	Low maxillary fracture/multiple segments
Le Fort II	Pyramidal fracture
IIa	Pyramidal and nasal fracture
IIb	Pyramidal and nasoorbitoethmoidal (NOE) fracture
Le Fort III	Craniofacial dysjunction
IIIa	Craniofacial dysjunction and nasal fracture
IIIb	Craniofacial dysjunction and NOE
Le Fort IV	Le Fort II or III fracture and cranial base fracture
IVa	Supraorbital rim fracture
IVb	Anterior cranial fossa and supraorbital rim fracture
IVc	Anterior cranial fossa and orbital wall fracture

95. Describe the Ellis classification of dental fractures.

Class I	Enamel only	Class III	Dentin, enamel, and pulp
Class II	Dentin and enamel	Class IV	Whole crown

96. Describe the management of each of the above fractures.

Class I	Enameloplasty and/or bonding
Class II	Dentin coverage with calcium hydroxide and bonded restoration or reattachment of fractured segment
Class III	Pulp therapy via pulp capping or partial pulpotomy

Class IV If the fracture is supragingival, remove the coronal segment and perform appropriate pulp therapy, then restore. If the fracture is subgingival, remove the coronal segment and perform appropriate pulp therapy, then reposition the remaining tooth structure coronally either orthodontically or surgically. The surgical approach results in loss of pulpal vitality and therefore requires a pulpectomy.

97. What are the most likely signs and symptoms of a mandibular body or angle fracture?

Alteration in occlusion	Mobility at the fracture site
A step or change in the mandibular occlusal plane	Pain at the fracture site
Lower lip numbness	Bleeding at the fracture site or submucosal hemorrhage

98. How is a displaced fracture of the mandibular body or angle treated?

A displaced mandibular fracture is treated by open reduction and internal fixation in combination with several weeks of intermaxillary fixation. This procedure involves exposing the mandible through an incision, reducing the fracture, and fixing the fracture segments with interosseous wires. Arch bars are placed on the teeth and used with either intermaxillary wires or elastics to maintain intermaxillary fixation for several weeks. In many cases, rigid internal fixation can be used to avoid intermaxillary fixation. These cases are treated by exposing the fracture area and applying a compression plate that provides absolute interosseous stability for the fracture. Interniaxillary fixation usually is not required.

99. What are the two causes of displacement of mandibular fractures?

Mandible fractures are displaced by the force that causes the fractures and by the muscles of mastication. Depending on the orientation of the fracture line, the attached muscles may cause significant displacement of fractures.

100. Are most fractures of the mandibular condyle treated by closed or open reduction?

Most fractures of the mandibular condyle are treated by closed reduction. Treatment usually consists of 1—4 weeks of intermaxillary fixation followed by mobilization and close follow-up.

101. What radiographs are used to diagnose mandibular fractures?

- Panoramic radiograph
- Occlusal radiography
- Periapical radiography
- Mandibular series
- Lateral oblique views
- Posteroanterior view
- Towne’s view
- Plain tomography
- CT scan

102. What are the likely signs and symptoms of a zygomatic fracture?

Pain over zygomatic region	Subconjunctival hemorrhage or ecchymosis
Numbness in the infraorbital nerve distribution	Submucosal or subconjunctival air emphysema
Swelling in the zygomatic region	Palpable step at the infraorbital rim
Depression or flatness of the zygomatic prominence	Exophthalmos
Nasal bleeding	Diplopia
Submucosal hemorrhage or ecchymosis	Unequal pupil level

103. Which radiographs are used to evaluate and diagnose zygomatic fractures?

1. Plain film
 - Waters' view (posteroanterior obliques)
 - Submental vertex
 - Tomograms
2. CT scan

104. Which bones articulate with the zygoma?

- Frontal bone
- Sphenoid bone
- Maxillary bone
- Temporal bone

105. How may mandibular function be affected by a fracture of the zygoma or zygomatic arch?

A depressed zygomatic or zygomatic arch fracture can impinge on the coronoid process or temporalis muscle, causing various degrees of trismus.

LOCAL ANESTHESIA

106. What are the major classifications of local anesthetics used in dentistry?

Classification of local anesthetics is based on the molecular linkage between hydrophilic and lipophilic groups of the molecule. The amides, such as xylocaine and mepivacaine, are the most commonly used class of local anesthetics and for the most part have replaced esters, such as procaine.

107. Do all local anesthetics used in dentistry have the same duration of action?

No. Long-lasting local anesthetics, such as etidocaine, provide surgical grade anesthesia about three times longer than generally used anesthetics, such as lidocaine.

108. What is the role of pH in determining the effectiveness of a local anesthetic?

Anesthetic solutions are acid salts of weak bases and have a pH in the range of 3.3—5.5. For the molecule to be active, the uncharged base must be available. If the tissue into which the solution is placed has a pH lower than the anesthetic solution, dissociation does not occur, and the amount of active base available is not adequate for a substantial anesthetic effect. A clinical example of this phenomenon is the injection of local anesthesia into an area of inflammation.

109. What are the advantages of including epinephrine in a local anesthetic solution?

There are two major advantages of including epinephrine in local anesthesia: (1) because epinephrine is a vasoconstrictor, it helps to maintain an optimal level of local anesthesia at the site of injection and thus reduces permeation of the drug into adjacent tissue, and (2) the vasoconstrictive properties of epinephrine also result in reduced intraoperative bleeding.

110. How significant is the concentration of epinephrine in local anesthetic solutions in affecting their hemostatic properties?

No difference in the degree or duration of hemostasis has been noted when solutions containing epinephrine of 1:100,000, 1:400,000 or 1:800,000 were compared. Five minutes should be allowed for epinephrine to achieve its maximal effect.

111. Which nerves are anesthetized using the Gow-Gates technique?

1. Inferior alveolar nerve
2. Lingual nerve
3. Mylohyoid nerve
4. Auriculotemporal nerve
5. Buccal nerve

112. Describe the best type of injections of local anesthesia for extractions of the following teeth:

Maxillary lateral incisor	Infiltration at apex Infiltration of buccal soft tissue Nasopalatine block
Maxillary first molar	Infiltration at apex Infiltration over mesial root and over apex of maxillary second molar Anterior palatine block
Mandibular canine	Inferior alveolar block Lingual nerve block
Mandibular second molar	Inferior alveolar block Lingual nerve block

Peterson U, Ellis E, Hupp JR, Tucker MR: Contemporary Oral and Maxillofacial Surgery. St. Louis, Mosby, 1988.

113. What are the symptoms and treatment for inadvertent injection of the facial nerve during the administration of local anesthesia?

The patient develops symptoms of Bell's palsy. The muscles of facial expression are paralyzed. The condition is temporary and self-limiting. However, the patient's eye should be protected, because closure of the eye on blinking may be limited.

114. How does a hematoma form after the administration of a local anesthetic? How is it treated?

Hematoma may occur when the needle passes through a blood vessel and results in bleeding into the surrounding tissue. Posterosuperior alveolar nerve blocks are most often associated with hematoma formation, although injection into any area, particularly a foramen, may have a similar result. Treatment of hematoma includes direct pressure and immediate application of cold. The patient should be informed of the hematoma and reassured. In healthy patients, the area should resolve in about 2 weeks. In patients at risk for infection, hematomas may act as a focus of bacterial growth. Consequently, such patients should be placed on an appropriate antibiotic. Penicillin, 500 mg orally every 6 hours for 1 week, is a reasonable choice.

115. What are the reasons for postinjection pain after the administration of a local anesthetic?

The most common causes of postinjection pain are related to injury of the periosteum, which results either from tearing of the tissue or from deposition of solution beneath the tissue.

116. What causes blanching of the skin after the injection of local anesthesia?

Arterial spasms caused by needle trauma to the vessel may result in sudden blanching of the overlying skin. No treatment is required.

117. What is the toxic dose of most local anesthetics used in dentistry? What is the maximal volume of a 2% solution of local anesthetic that can be administered?

The toxic dose for most local anesthetics used in dentistry is 300—500 mg. The standard carpule of local anesthetic contains 1.8 cc of solution. Thus, a 2% solution of lidocaine contains 36mg of drug ($2\% \text{ solution} = 20\text{mg/ml} \times 1.8\text{ml} = 36\text{mg}$). Ten carpules or more are in the toxic range.

118. What is the most common adverse reaction to local anesthesia? How is it treated?

Syncope is the most common adverse reaction associated with administration of local anesthesia. Almost half of the medical emergencies that occur in dental practice fall into this category. Syncope typically is the

consequence of a vasovagal reaction. Treatment is based on early recognition of a problem; the patient often feels uneasy, queasy, sweaty, or lightheaded. The patient should be reassured and positioned so that the feet are higher than the head (Trendelenburg position); oxygen is administered. Tight clothing should be loosened and a cold compress placed on the forehead. Vital signs should be monitored and recorded. Ammonia inhalants are helpful in stimulating the patient.

POSTOPERATIVE MANAGEMENT AND WOUND HEALING

119. What are the principal components of postoperative orders?

- Diagnosis and surgical procedure
- Patient's condition
- Allergies
- Instructions for monitoring of vital signs
- Instructions for activity and positioning
- Diet
- Medications
- Intravenous fluids
- Wound care
- Parameters for notification of dentist
- Special instructions

Peterson U, Ellis E, Hupp JR, Tucker MR: Contemporary Oral and Maxillofacial Surgery. St Louis, Mosby, 1988.

120. What is "dead space"?

Dead space is the area in a wound that is free of tissue after closure. An example is a cyst cavity after enucleation of the cyst. Because dead space often fills with blood and fibrin, it has the potential to become a site of infection.

121. What are the four ways that dead space can be eliminated?

- I. Loosely suture the tissue planes together so that the formation of a postoperative void is minimized.
2. Place pressure on the wound to obliterate the space.
3. Place packing into the void until bleeding has stopped.
4. Place a drain into the space.

122. What is postoperative ecchymosis? How does it occur? How is it managed?

Ecchymosis is a black and blue area that develops as blood seeps submucosally after surgical manipulation. It is a self-limiting condition that looks more dramatic than it actually is. Patients should be warned that it may occur. Although no specific treatment is indicated, moist heat often speeds resolution.

123. What are the causes of postoperative swelling after an oral surgical procedure?

The most common cause of swelling is edema. Swelling due to edema usually reaches its maximum 48—72 hours after the procedure and then resolves spontaneously. It can be minimized by application of cold to the surgical site for

20-minute intervals on the day of surgery. Beginning on the third postoperative day, moist heat may be applied to swollen areas. Patients should be informed of the possibility of swelling. Swelling after the third postoperative day, especially if it is new, may be a sign of infection, for which patients need appropriate assessment and management.

124. What is primary hemorrhage? How should it be treated?

Primary hemorrhage is postoperative bleeding that occurs immediately after an extraction. In essence, the wound does not stop bleeding. To permit clear visualization and localization of the site of bleeding, the mouth should be irrigated thoroughly with saline. The patient's overall condition should be assessed. Once the general site of bleeding is identified, pressure should be applied for 20–30 minutes. Extraneous granulation tissue or tissue fragments should be carefully debrided. If the source of the bleeding is soft tissue (e.g., gingiva), sutures should be applied. If the source is bone, the bone may be burnished. Bee's wax can be applied. Placement of a hemostatic agent, such as a surgical gel, in the socket may be followed by the placement of interrupted sutures. The patient then should be instructed to bite on gauze for 30 minutes. At the end of that time, coagulation should be confirmed before the patient is dismissed.

A clot may fail to form because of a quantitative or functional platelet deficiency. The former is most readily assessed by obtaining a platelet count. The normal platelet count is 200,000–500,000 cells/mm³. Prolonged bleeding may occur if platelets fall below 100,000 cells/mm³. Treatment of severe thrombocytopenia may require platelet transfusion. Qualitative platelet dysfunction most often results from aspirin ingestion and is most commonly measured by determining the bleeding time. Prolonged bleeding time requires consultation with a hematologist.

125. What is secondary hemorrhage? How is it treated?

Secondary hemorrhage occurs several days after extraction and may be due to clot breakdown, infection, or irritation to the wound. The mouth first should be thoroughly irrigated and the source of the bleeding identified. The wound should be debrided. Sources of local irritation should be eliminated. The placement of sutures or a hemostatic agent may be necessary. Patients with infection should be placed on an antibiotic. If local measures fail to stem the bleeding, additional studies, especially relative to fibrin formation, are indicated.

126. Describe the stages of wound healing.

The **inflammatory stage** begins immediately after tissue injury and consists of a vascular phase and a cellular phase. In the vascular phase initial vasoconstriction is followed by vasodilatation, which is mediated by histamine and prostaglandins. The cellular phase is initiated by the complement system, which acts to attract neutrophils to the wound site. Lymphocytic infiltration follows. Epithelial migration begins at the wound margins.

During the **fibroplastic stage**, wound repair is mediated by fibroblasts. New blood vessels form, and collagen is produced in excessive amounts. Foreign and necrotic material is removed. Epithelial migration continues.

In the **remodeling stage**, the final stage of wound healing, collagen fibers are arranged in an orderly fashion to increase tissue strength. Epithelial healing is completed.

127. What is the difference between healing by primary and secondary intention?

In healing by primary intention, the edges of the wound are approximated as they were before injury, with no tissue loss. An example is the healing of a surgical incision. In contrast, wounds that heal by secondary intention involve tissue loss, such as an extraction site.

128. What are the five phases of healing of extraction wounds?

1. Hemorrhage and clot formation
2. Organization of the clot by granulation tissue
3. Replacement of granulation tissue by connective tissue and epithelialization of the wound
4. Replacement of the connective tissue by fibrillar bone
5. Recontouring of the alveolar bone and bone maturation

IMPLANTOLOGY

129. What are dental implants?

Dental implants are devices that are placed into bone to act as abutments or supports for prostheses.

130. Describe the differences in the bone-implant interface between osseointegrated implants and blade implants.

Osseointegrated (osteointegrated) implants interface directly with the bone, resulting in a relationship that mimics ankylosis of a tooth to bone. Osseointegrated implants are typically cylinders made of titanium. In contrast, blade implants are usually fabricated of surgical stainless steel. The interface between the implant and bone is filled with connective tissue fibers similar to the periodontal ligament.

131. What type of implants are currently favored?

Osseointegrated implants.

132. What are the requirements for successful implant placement?

- Biocompatibility
- Mucosal seal
- Adequate transfer of force

133. The surgical placement of most osseointegrated implants usually requires two steps. What are they? How long between them?

The first step is the actual placement of the implant. Most implants are covered with soft tissue during the time that they integrate with bone. This process takes between 3–6 months. After this period, a second surgical procedure is performed, during which the implant is exposed. Some brands of implants are not “buried” during the period of osseointegration, and therefore do not require a second surgical procedure.

134. Describe the major indications for the consideration of implants as a treatment alternative.

- Resorption of alveolar ridge or other anatomic consideration does not allow for adequate retention of conventional removable prostheses
- Patient is psychologically unable to deal with removable prostheses
- Medical condition for which removable prostheses may create a risk, i.e., seizure disorder
- Patient has a pronounced gag reflex that does not permit the placement of a removable prosthesis
- Loss of posterior teeth, particularly unilaterally

135. What are the major contraindications for the placement of implants?

- Pathology within the bone
- Limiting anatomic structures such as the inferior alveolar nerve or maxillary sinus
- Unrealistic outcome expectations from patient
- Poor oral health and hygiene
- Patient inability to tolerate implant procedures because of a medical or psychological condition

136. What is the prognosis of osseointegrated implants placed in an edentulous mandible? Maxilla?

According to studies with implants developed by Branemark, the stability of implant-supported continuous bridges for a 5- to 12-year period was 100% in the mandible and 90% in the maxilla.

137. What are the steps in the assessment of patients prior to implant placement?

- Medical and dental history
- Clinical examination
- Radiographic examination

138. Which radiographic studies are used for patient assessment before implant placement?

For many implant cases, panoramic and periapical radiographs provide adequate information relative to bone volume and the location of limiting anatomic structures. In some instances, CT may be especially useful in providing information relative to multiplanar jaw configuration.

139. During preparation of the implant recipient site, what is the maximal temperature that should develop at the drill-bone interface?

To prevent necrosis of bone, a maximal temperature of 40° C has been recommended. This goal is achieved through the use of copious external or internal saline irrigation and low-speed, high-torque drills. In the final step of implant site preparation, the drill rotates at a speed of only 10—15 rpm.

140. What is the best way to ensure proper implant placement and orientation?

Careful pretreatment evaluation and preparation by *both* surgeon and restoring dentist are critical. A surgical stent fabricated to the specifications of the restoring dentist is an extremely helpful technique. Lack of pretreatment communication and planning may result in implants that are successfully integrated but impossible to restore.

141. Do any data suggest that osseointegration of implants may occur when implants are placed into an extraction site?

Some data suggest that placement of an implant into an extraction site may be successful, especially if the implant extends apically beyond the depth of the extraction site. Conventional treatment, however, consists of a period of 3 months from extraction to implant placement.

142. What anatomic feature of the anterior maxilla must be evaluated before placement of an implant in the central incisor region?

The incisor foramen must be carefully evaluated radiographically and clinically. Variations in size, shape, and position determine the position of maxillary anterior implants. Fixtures should not be placed directly into the foramen.

143. Which anatomic site is the most likely to yield failed implants?

Implants placed in the maxillary anterior region are the most likely to fail. Because short implants are more likely to fail than longer implants, the longest implant that is compatible with the supporting bone and adjacent anatomy should be used.

144. Do definitive data support the contention that implanted supported teeth should not be splinted to natural teeth?

This issue is controversial, but available data refute the claim that bridges with both implant and natural tooth abutments do more poorly than bridges supported only by implants.

Gunne J, Astrand P, Ahlen K, et al: Implants in partially edentulous patients: A longitudinal study of bridges supported by both implants and natural teeth. Clin Oral Implant Res 3:49—56, 1992.

145. Is there any reason to avoid the use of fluorides in implant recipients?

Yes. Acidulated fluoride preparations may corrode the surface of titanium implants.

146. Do implants need periodic maintenance once they are placed?

Like natural teeth, poorly maintained implants may demonstrate progressive loss of supporting bone, which may result in implant failure. Aggressive home care is necessary to ensure implant success. Plastic-tipped instruments are available for professional cleaning.

147. What is the most common sign that an implant is failing?

Mobility of the implant is regarded as an unequivocal sign of implant failure.

PAIN SYNDROMES AND TEMPOROMANDIBULAR JOINT DISORDERS

148. What is trigeminal neuralgia?

Trigeminal neuralgia, or tic douloureux, results in severe, lancinating pain in a predictable anatomic location innervated by the fifth cranial nerve. The pain typically is of short duration but extremely intense. Stimulation of a trigger point initiates the onset of pain. Possible etiologies include multiple sclerosis, vascular compression of the trigeminal nerve roots as they emerge from the brain, demyelination of the gasserian ganglia, trauma, and infection.

149. Discuss the treatment of trigeminal neuralgia.

Drug therapy is the primary treatment for most forms of trigeminal neuralgia. Carbamazepine and antiepileptic drugs are used most often. If drug therapy fails, surgical intervention may be necessary. Surgical options include rhizotomy and nerve compression.

150. What symptoms are associated with temporomandibular (TMJ) disorders?

TMJ disorders are characterized by the presence of one or more of the following:

- Preauricular pain and tenderness
- Limitation of mandibular motion
- Noise in the joint during condylar movement
- Pain and spasm of the muscles of mastication

151. What are the two most common joint sounds associated with TMJ disorders? How do they differ?

Clicking and crepitus are the two most common joint sounds associated with TMJ disorders. Whereas clicking is a distinct popping or snapping sound, crepitus is a scraping, continuous sound. Sounds are best distinguished by use of a stethoscope.

152. What are the components of evaluation of the patient with TMJ symptoms?

Evaluation of the patient with TMJ symptoms should include a detailed history of the problem, a thorough physical examination, and appropriate radiographic and imaging studies.

153. What should be included in the physical examination of the patient with TMJ symptoms?

- Gross observation of the face to determine asymmetry
- Palpation of the muscles of mastication
- Observation of mandibular motion
- Palpation of the joint
- Auscultation of the joint
- Intraoral examination of the dentition and occlusion

154. What are parameters for normal mandibular motion?

The normal vertical motion of the mandible results in 50 mm of intraincisor distance. Lateral and protrusive movement should range to approximately 10 mm.

155. What radiographic and imaging studies are of value in evaluating the TMJ ?

No single radiographic study can be applied universally for definitive evaluation of the TMJ. Instead, a combination of lateral and anteroposterior views may be appropriate to diagnose intraarticular bony pathology. Lateral techniques include transcranial, panoramic, and tomographic studies. Anteroposterior views include transorbital, modified Towne, and tomographic examinations. Computed tomographic studies may provide the most definitive information for the assessment of bony disease of the joint and surrounding structures. Magnetic resonance imaging (MRI) is the technique of choice to evaluate soft-tissue changes within the joint.

156. What is the likelihood that a patient with TMJ symptoms will demonstrate identifiable pathology of the joint?

Only 5—7% of patients presenting with TMJ symptoms have identifiable pathology of the joint. Based on this frequency, it clearly makes sense to proceed initially with conservative, reversible treatment.

157. What is the most common disorder associated with the TMJ?

Myofascial pain dysfunction (MPD) is the most common clinical problem associated with the TMJ.

158. What is the cause of MPD?

The cause of MPD is multifactorial. Functional, occlusal, and psychological factors have been associated with its onset. Fortunately, most cases are self-limiting.

159. What occlusal factors may contribute to MPD?

Clenching and bruxing may be associated with MPD, because each may result in muscle spasm or soreness. Lack of posterior occlusion, which results in changes in the relationship of the jaws, also is a potential cause. The placement of restorations or prostheses that alter the occlusion may cause MPD directly or indirectly through the patient's attempt to accommodate changes in vertical dimension.

160. What patient group is at highest risk for MPD?

Of patients with MPD, 70—90% are women between the ages of 20 and 40 years.

161. What are the diagnostic criteria for myofascial pain syndrome?

1. Tender areas in the firm bands of the muscles, tendons, or ligaments that elicit pain on palpation
2. Regional pain referred from the point of pain initiation
3. Slightly diminished range of motion

Sturdivant J, Friction JR: Physical therapy for temporomandibular disorders and orofacial pain. *Curr Opin Dent* 1:485—496, 1991.

162. What signs and symptoms are associated with MPD?

Patients with MPD may have some or all of the following:

- Pain on palpation of the muscles of mastication
- Pain of the joint on palpation
- Pain on movement of the joint
- Altered TMJ function, including trismus, reduced opening, and mandibular deviation on opening
- Joint popping, clicking or crepitus
- Stiffness of the jaws
- Facial pain
- Pain on opening

163. What radiographic findings are associated with MPD?

None. Radiographic studies of the joint of patients with MPD fail to demonstrate the presence of pathology.

164. Describe the treatment approach to MPD.

Because most cases of MPD are self-limiting, a conservative, reversible approach to intervention is recommended. Patients should be informed of the condition and its frequency in the overall population (patients always feel better knowing that they have something that is “going around” rather than some rare, exotic disease), then reassured. Mobility of the joint should be minimized. A soft diet, limited talking, and elimination of gum chewing should be recommended. Moist heat, applied to the face, is often helpful in relieving muscle spasms. Diazepam has two pharmacologic actions that make it an especially good medication in the treatment of MPD: it is a major muscle relaxant, and it is anxiolytic. A typical dose may be 5 mg 1 hour before sleep and then 2 mg 2–3 times during the day. Patients should be cautioned that the drug may cause drowsiness. In general, diazepam rarely needs to be continued for more than 1 week to 10 days. Pain symptoms generally respond to nonsteroidal antiinflammatory agents. For patients with evidence of occlusal trauma or abnormal function, fabrication of an occlusal appliance may be helpful.

165. What are the indications for superficial heat in the treatment of facial muscle and TMJ pain?

1. To reduce muscle spasm and myofascial pain
2. To stimulate removal of inflammatory byproducts
3. To induce relaxation and sedation
4. To increase cutaneous blood flow

Sturdivant J, Friction JR: Physical therapy for temporomandibular disorders and orofacial pain. *Curr Opin Dent* 1:485–496, 1991.

166. What are the contraindications for using superficial heat to treat facial pain?

1. Acute infection
2. Impaired sensation or circulation
3. Noninflammatory edema
4. Multiple sclerosis

Sturdivant J, Friction JR: Physical therapy for temporomandibular disorders and orofacial pain. *Curr Opin Dent* 1:485–496, 1991.

167. What is the function of ultrasound in the therapy of myofascial pain?

Ultrasound provides deep heat to musculoskeletal tissues through the use of sound waves. It is indicated for treatment of muscle spasm or contracture, inflammation of the TMJ, and increased sensitivity of the joint ligament or capsule, and as a technique to push antiinflammatory drugs, such as steroid ointments, into the tissue. It is contraindicated in areas of acute inflammation, infection, cancer, impaired sensation, or noninflammatory edema. Ultrasound is typically administered by a physical therapist.

168. What is internal derangement of the TMJ?

Although internal derangement refers to disturbances among the articulating components within the TMJ, it is generally applied to denote changes in the relationship of the disc and the condyle.

169. What are the main categories of internal derangement?

- Anterior displacement of the disc with reduction, in which the meniscus is displaced anteriorly when the patient is in a closed-mouth position but reduces to its normal position on opening. Patients experience a click on both opening and closing.
- Anterior displacement of the disc without reduction (also called a closed lock)
- Disc displacement with perforation

170. What are the common symptoms of internal derangement?

- Pain, usually in the preauricular area and usually constant, increasing with function
- Earache
- Tinnitus
- Headache
- Joint noise
- Deviation of the mandible on opening

171. What imaging techniques are useful in the diagnosis of internal derangement?

MRI and arthrography are the imaging techniques of choice for evaluating soft-tissue changes of the joint. Because of its lack of invasiveness, MRI is preferred.

172. What is the treatment of internal derangement?

Initial treatment should be similar to MPD and is successful in a reasonable number of cases, particularly in patients with anterior disc displacement with reduction. Surgical intervention may be required in patients who do not respond to conservative therapy.

173. What are the most common causes of ankylosis of the TMJ?

Infection and trauma are the most common causes of ankylosis caused by pathologic changes of joint structures. Severe limitation of TMJ function also may be caused by non-TMJ factors, such as contracture of the masticatory muscles, tetanus, psychogenic factors, bone disease, tumor, or surgery.

174. Are tumors of the TMJ common?

No. Tumors of the joint itself are rare. However, benign connective tumors are common, including osteomas, chondromas, and osteochondromas. Both

benign and malignant tumors also may affect structures adjacent to the joint and thereby affect TMJ function.

175. What is the effect of radiation therapy on the TMJ?

Patients receiving radiation therapy for the treatment of head and neck cancer may experience fibrotic changes of the joint. Consequently, they have difficulty with opening. Exercise may help to minimize such functional changes.

176. What is the effect of orthodontic therapy on the development of temporomandibular dysfunction?

The results of many well-controlled scientific studies have revealed no causal relationship between orthodontics and temporomandibular dysfunction.

177. What about extraction therapy?

Again, the results of several well-controlled studies offer no support to the contention that extraction therapy may precipitate TMJ disorders.

178. What degenerative diseases can affect the TMJ?

Osteoarthritis, osteoarthrosis, and rheumatoid arthritis may affect the TMJ. Over time, radiographs may demonstrate degenerative changes of joint structures. Often patients have a history of one of these conditions elsewhere in the body.

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