Complications of Extractions

A Peer-Reviewed Publication
Written by Donald Testa, DDS and Michael Florman, DDS

This course has been made possible through an unrestricted educational grant. The cost of this CE course is $59.00 for 4 CE credits.

Cancellation/Refund Policy: Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.
Educational Objectives
Upon completion of this course, the clinician will be able to do the following:
1. Understand the components of careful evaluation and planning to reduce risks when performing extractions
2. Understand factors that tend to increase the difficulty of extractions
3. Understand protocols to prevent problems resulting from extractions and the necessity of investigating patients’ health histories
4. Understand the challenges of bleeding—dangers of hemorrhaging, causes of bleeding, and hemostatic agents available in the industry to minimize bleeding

Abstract
The many risks and considerations involved when performing an extraction can present a particular challenge to the dental professional, especially regarding management of bleeding. Many factors can increase the potential difficulty of an extraction, including difficult root morphology and some inflammatory disorders, but with a thorough medical history, a complete pre-operative examination, and adherence to proper surgical guidelines, complications can be kept to a minimum. Due to the high vascularization of the head and neck region, bleeding is a normal and expected part of the extraction process, but precautions must be taken to avoid hemorrhage. Hemostatic agents such as absorbable gelatin sponge, topical thrombin, and/or oxidized regenerated methylcellulose are frequently used to manage post-operative bleeding. Secondary bleeding, delayed healing, and dry socket are all common complications of extractions, although of these, dry socket is usually the primary cause for concern. A variety of methods for preventing and treating dry socket are discussed and evaluated in this article.

Introduction
Careful evaluation and planning reduce risks. The standard of care requires a thorough medical history prior to performing any surgery, including prior medical and dental history, prior surgeries, and pharmacology therapy. For high-risk patients, a consultation should be obtained with the patient’s healthcare providers.

As a surgeon, you must always follow proper surgical techniques. You need to know your limitations prior to beginning any extraction and consider referring to a specialist if confronted with a case beyond your experience. Should you find yourself in a situation in the middle of a case; pause, take a deep breath, and carefully review all your options. At times, discretion is the better part of valor, and it is best to stop. Continuing to chase root tips could lead to additional and more involved surgery, or could invade the sinus, the neurovascular bundle, or other vital anatomic structures. It is best to stop and temporize, carefully explain the situation to the patient, and refer to a specialist for completion of the procedure.

Factors That Tend to Increase the Difficulty of Extractions
A careful pre-operative evaluation is also mandated by the standard of care. This includes a thorough physical examination as well as a complete radiographic examination. X-rays should demonstrate the entire tooth and surrounding anatomy. Do not accept cone-cut or improperly processed films. Use panoramic or extra-oral radiographs when intra-oral films are nondiagnostic.

Carefully review the films pre-operatively. Take particular note of features such as:
1. Difficult root morphology (divergent, hooked, locked, ankylosed, geminated, misshapen, or exhibiting hypercementoses);
2. Teeth containing weakened coronal surfaces due to large restorations;
3. Teeth that have been abraded or exhibit fractures or deep caries;
4. Desiccated or brittle teeth associated with endodontic treatment;
5. Inflammatory disorders associated with alveolar bone, including Paget’s disease; and
6. Radionecrotic bone caused by radiation therapy.

Normal Healing Process
Immediately after teeth are extracted, blood flowing from alveolar bone and gingiva begins to clot. The clot prevents debris, food, and other irritants from entering the extraction site; protects the underlying bone; and acts as a supporting system in which granulation tissue develops.

Tissue damage provokes the inflammatory reaction, causing the vessels of the socket to expand. Leucocytes and fibroblasts invade from the surrounding connective tissues until the clot is replaced by granulation tissue. Leucocytes gradually digest the clot, while epithelium begins to proliferate over the surface during the second week post-operatively. This eventually forms a complete protective covering.

During this time, there is an increased blood supply to the socket, which is associated with resorption of the dense lamina dura by osteoclasts. Small fragments of bone that have lost their blood supply are encapsulated by osteoclasts and eventually pushed to the surface or resorbed.

Approximately one month after an extraction, coarse woven bone is laid down by osteoblasts. Trabecular bone then follows, until the normal pattern of the alveolus is restored. Finally, compact bone forms over the surface of the alveolus, and remodeling continues.

Bleeding Challenges
The high vascularization of the head and neck region is both friend and foe to the dental surgeon. The increased blood sup-
ply accelerates healing, but the surgeon needs to take precautions in order to avoid hemorrhage.

Once a tooth is extracted, direct primary wound closure is sometimes impossible due to insufficient soft tissue. It is difficult to sustain direct pressure to the socket of an extracted tooth. Disruptive forces, such as those from the tongue, food, and normal speech, can complicate things even further. Salivary enzymes also interfere with blood clotting and the processes that follow in the evolution of the clot.

Preventing Problems and Health History

A thorough medical history should include questions regarding bleeding problems and possible genetic diseases. Some conditions that may prolong bleeding are nonalcoholic liver disease (primarily hepatitis) and hypertension. Techniques to manage bleeding may employ the administration of blood transfusions containing adequate factor replacement to allow for hemostasis.

Complete and current medication lists should be documented and checked against references that may indicate side effects. It is also advisable that patients taking an extensive number of medications receive clearance from their treating physician prior to undergoing anesthesia and surgery. Many drugs interfere with coagulation. There are five main groups of drugs known to promote bleeding: aspirin, broad-spectrum antibiotics, anticoagulants, alcohol, and chemotherapeutic agents. Aspirin and aspirin-containing preparations interfere with platelet function and bleeding time. Broad-spectrum antibiotics decrease the production of vitamin K necessary for coagulation factors produced in the liver. Anticoagulant drugs speak for themselves. Chronic alcohol abuse can lead to liver cirrhosis and decreased production of liver-dependent coagulation factors. Chemotherapeutic agents that interfere with the hematopoietic system can reduce the number of circulating platelets. Patients who are known or suspected to have bleeding disorders should be evaluated and laboratory-tested before surgery.

Bleeding

Once the tooth is completely removed, the wound should be properly debrided and inspected for the presence of any specific bleeding points or other potential anomalies. Complete hemostatic control can usually be maintained by using direct pressure over the area of soft tissue for approximately five minutes. In more severe cases, a bleeding arteriole may need to be isolated, clamped, cauterized, or ligated.

Bleeding can also occur from isolated vessels within the bone. Treatment involves placing sustained pressure with the closed end of an instrument such as a hemostat. This will usually occlude the bleeding vessel. Once the bleeding has been controlled, the socket should be covered with a moistened 2×2 or 4×4 inch gauze sponge that has been folded to fit directly into the extraction site. The patient should be instructed to bite down firmly on this damp gauze sponge for at least 30 minutes. Do not dismiss the patient from the office until hemostasis has been achieved.

Check the patient’s extraction socket approximately 15 minutes after the completion of surgery. The patient should open his or her mouth wide, the gauze should be removed, and the area should be inspected carefully for any persistent bleeding or oozing. Replace the gauze with a new piece and repeat in 30 minutes. If bleeding persists and inspection reveals no arterial bleeding, the surgeon should consider placing a hemostatic agent into the socket and applying a gauze sponge over the top of the socket, holding it in place with pressure.

Hemostatic Agents

The most commonly used and least expensive hemostatic agent is absorbable gelatin sponge (Gelfoam® Pfizer). Gelfoam sterile compressed sponge is a pliable surgical hemostat prepared from specially treated purified gelatin solution that is capable of absorbing many times its weight in whole blood. It is designed to be placed into the socket and retained with a suture in a dry state. Gelfoam forms a scaffold for the formation of a blood clot and has been used to aid in primary closure for large extraction sites.

Oxidized regenerated methylcellulose (Surgicel® Johnson & Johnson) is another hemostatic agent used in dental
surgery. It binds platelets and chemically precipitates fibrin when placed into the socket and sutured. It cannot be mixed with thrombin.

Topical thrombin (Thrombostat® Pfizer) is derived from bovine thrombin (5,000 units). Thrombin is formed in normal individuals toward the end of the coagulation cascade and helps to convert fibrinogen to fibrin, which forms the clot. If a patient has a defect in any of the clotting factors, bleeding time may be prolonged and topical thrombin may help to control hemostasis. Form a piece of Gelfoam to the shape of the socket, saturate it with thrombin, and insert into the tooth socket.

Collagen products can also be used to help control bleeding, by promoting platelet aggregation and thereby accelerating blood coagulation. Microfibrilar collagen (Avitene® Davol) is a fibular material that is loose and fluffy but capable of being packed. Atelo-collagen (Foundation™ J. Morita) is processed into a sponge block and then formed into a bullet shape for easy placement into an extraction socket. Collaplug® and Collatape® (Sulzer Calcitek) are more highly crosslinked collagen products that can also be packed. Collagen products stimulate platelet adherence to help stabilize the clot. Therefore, they are particularly useful for patients with stage one bleeding disorders, such as those who have been long-term users of aspirin or NSAIDs.

Case Study: Extraction of tooth #8 due to severe periodontal defect

Images courtesy of Kodama Dental Clinic, Japan

There are new unique products available in the collagen category. One new product is a solid bullet shaped bone filling augmentation material made from bovine collagen only. A unique manufacturing process has produced a pure collagen material that is both osteoinductive and osteoconductive. The plug is placed into a well curetted extraction socket and a single passive suture is placed. Surrounding cells and capillaries infiltrate the plug and the socket is gradually replaced with the patient’s own augmented bone at an accelerated pace.

Secondary Bleeding

Patients will sometimes return to the office with secondary bleeding. In these cases, the extraction site should be cleared of all blood and saliva using suction. The dental surgeon should visualize the site to carefully determine the source of bleeding. If it is determined that the bleeding is generalized, the site should be covered with a folded, damp gauze sponge and held in place with firm pressure by either the dentist or dental auxiliary for at least five to 10 minutes. This measure is sufficient to control most bleeding. If five to 10 minutes of this treatment does not control the bleeding, the dental surgeon should consider a local anesthetic and treat the socket more aggressively. Block techniques are encouraged. If infiltration is used and the anesthetic contains a vasoconstrictor such as epinephrine, temporary vasoconstriction may be achieved to help control bleeding. Keep the patient under careful observation as the vasoconstrictor wears off to ensure that bleeding does not recur.

Once anesthesia has been achieved, gently curette the tooth extraction socket and suction all areas of the old blood clot. The specific area of bleeding should be identified. The same measures described for control of primary bleeding should be followed. The use of Gelfoam saturated with topical thrombin and then sutured is an effective way to stop bleeding. Reinforcement should be repeated with the application of firm pressure from a small, damp gauze sponge. In many situations, Gelfoam and gauze sponge pressure is adequate. Before the patient with secondary bleeding is discharged to go home, the clinician should monitor the patient for at least 30 minutes to ensure that adequate hemostatic control has been achieved. Be certain to give the patient specific instructions on how to apply gauze packs and pressure directly to the bleeding site should additional bleeding occur.

Subcutaneous tissue spaces may become collection areas for bleeding associated with some extractions. When this occurs, overlying soft tissue areas will appear bruised two to five days after the surgery. This bruising is called ecchymosis and may extend into the neck and as far as the upper anterior chest. Elderly patients in particular should be warned of the potential for ecchymosis, as they are most susceptible to it. Reducing trauma is the best way to prevent ecchymosis. Moist heat may be applied to speed up the recovery. Careful asepsis and thorough wound debridement should be performed during surgery. Irrigate bone copiously with saline to aid in the removal of foreign debris and consider the use of antibiotics when indicated.

Delayed Healing

Normal healing of the extraction site is dependent on blood clot formation, the progression of that clot to an organized matrix, and the formation of bone. Failure of a blood clot to form is uncommon except in cases where there is a loss or interruption of the local blood supply.
Delayed wound healing is most commonly caused by infection. Signs and symptoms associated with infection include fever, swelling, and erythema.

Wound dehiscence should be avoided by following good surgical techniques. Leaving unsupported soft tissue flaps can often lead to tissue sagging and separation along the incision line. Suturing wounds under tension can cause ischemia of flap margins and may lead to tissue necrosis.

Other factors that can delay healing are prolonged bleeding due to clotting defects, formation of an oro-antral fistula, presence of a malignant tumor, radiation therapy, immunosuppression, dietary deficiencies, and immune system disorders.

**Dry Socket Identification**

Dry socket, also known as alveolar osteitis, delays the healing of the extraction site and surrounding bone. Moderate to severe localized pain near the extraction site developing on or after the third or fourth day post-extraction is a sure sign of dry socket. Patients may experience an apparent improvement on the second day only to be followed by a sudden worsening of the pain on the third. The pain is moderate to severe, consisting of a dull aching sensation, usually throbbing and radiating to the ear. Examination usually reveals an empty socket, exposed bone surfaces, and a partially or completely lost blood clot. A foul odor and taste may or may not be present as well. Control of the pain is very difficult even with narcotic analgesics. There is usually immediate and dramatic relief after placement of dry-socket products.

**Incidence**

The incidence of dry socket has been reported in the literature by many investigators and varies widely from one study to another: anywhere from 0.5 percent to 68.4 percent. The average is approximately 3 percent of all extractions. It has been shown that the occurrence of dry socket is between nine and 30 percent in impacted mandibular third molars. The condition occurs twice as often after single extractions as it does after multiple extractions completed during the same time frame.

**Etiology and Predisposing Factors**

Fibrinolysis is the breakdown or failure of normal clot formation due to high levels of fibrinolytic or proteolytic activity in and around the socket. Fibrinolytic activity results in lysis of the blood clot and subsequent exposure of the bone.

Dry sockets tend to be more common in the mandible than in the maxilla and more common in posterior teeth than anteriors. Sites affected, ranked in order from highest to lowest, are the lower molars, upper molars, premolars, canines, and incisors.

Studies have demonstrated that the more difficult the extraction, the higher the chance of dry socket. It has also been demonstrated that if the procedure is carried out by less-experienced dental surgeons that there is a higher incidence of dry socket in lower third molars. The peak age for dry sockets is 30 to 34 years. Most reported cases occur between the ages of 20 and 40.

Bacteria, especially anaerobic bacteria, have been linked to the formation of dry sockets. Investigators have found strains of streptococci, fusospirochaetal, Treponema denticola, and bacteroides within extraction sites.

Studies have shown that smokers are four times more likely to develop third molar dry sockets than nonsmokers. This may be related to the creation of suction when inhaling, contamination of the socket with smoke, or increased temperatures in the oral cavity.

Researchers have identified that women have a 20 percent higher chance of developing dry socket than men. Oral contraceptives are also linked to a higher incidence of dry socket.

Patients with uncontrolled diabetes mellitus have a greater incidence of dry socket. Additionally, diabetics tend to heal more slowly. Because of this, diabetics need to be carefully managed pre-operatively, including possibly adjusting or reducing their medications, and should be fully monitored both intra-operatively and post-operatively.

**Prevention of Dry Socket**

Techniques that will prevent dry socket as well as developing treatments have been a topic of interest in oral surgery for many years. Well-controlled studies indicate that the incidence of dry socket after mandibular third molar surgery can be reduced, primarily through thorough debridement and irrigation of the extraction site with large quantities of saline.

The incidence of dry socket may be further decreased by pre-operative and post-operative rinsing with antimicrobial mouth rinses, such as chlorhexidine gluconate (Peridex® Zila Pharmaceuticals). A study was performed involving pre-operative prophylaxis in conjunction with chlorhexidine gluconate 0.2 percent rinse. Incidence of dry socket was decreased to some degree. Use of other medicaments such as Betadine mouthwash may also be useful in reducing bacterial loads prior to surgery.

Use of topically placed antibiotics administered within the extraction site immediately after completion of the extraction has been the most widely studied modality to reduce dry socket. Antibiotics such as clindamycin or tetracycline have been successfully used to help decrease the incidence of dry socket in mandibular third molars.

**Tetracycline**

One study showed that the incidence of dry socket is significantly reduced when a square of Gelfoam dipped into a suspension of tetracycline and a few drops of saline is used as dressing after impacted mandibular third molar extractions. This study supports findings reported by other authors. Both the tetracycline studies had strikingly similar findings, showing an average rate of incidence of 3.8 percent when using tetracycline prophylactically.
Another study looked at neomycin, bacitracin, and tetracycline combined with saline, soaked in Gelfoam, and placed in the extraction socket of third molars. Results demonstrated that tetracycline was far more effective than either neomycin or bacitracin in decreasing the incidence of dry socket.

**Clindamycin**

Trieger studied the effects of a 1x1cm square of Gelfoam soaked with 1ml of clindamycin phosphate solution (150 milligrams/milliliter) compared to controls using no clindamycin. Results indicated that out of 172 impacted molar sites, only seven dry sockets occurred, all of which were control sites that were not exposed to clindamycin. Clindamycin is especially preferred as the drug of choice in the prevention of dry socket due to its effectiveness against anaerobic pathogens.

Chapnick performed a study of 520 mandibular teeth in 270 patients. Sites were irrigated with Betadine® (Purdue Frederick) prior to placement of clindamycin. One site received Gelfoam soaked in clindamycin, and the other received Gelfoam without clindamycin. Results indicated that there was a significant decrease in dry socket in the sites that received Gelfoam soaked in clindamycin.

These studies demonstrate a reduced incidence in dry socket when antibiotic medicaments are placed, as low as 3 percent compared to 36 percent. There is evidence that bacteria plays a role in the fibrinolytic phenomenon of dry socket through mechanisms not yet understood.

**Treating Dry Socket**

Treatment of dry socket should be focused on relieving pain. With or without treatment, it will take about two weeks to resolve, and the patient should be kept comfortable.

Treatment should begin by gently irrigating with saline and inserting a medicated dressing. Do not aggressively curette the socket, as this will increase the amount of exposed bone and, subsequently, the degree of pain. All excess saline should then be carefully suctioned from the socket, and a small piece of gelatin sponge or gauze soaked with the medication should be placed. This may need to be repeated every two to three days until the patient is comfortable.

At each visit, the socket will need to be irrigated, and the medicated dressing replaced.

Medicaments used to treat dry socket may contain a combination of bone pain relievers (Eugenol, benzocaine), antimicrobials (iodoform), and carrying vehicles (Balsam of Peru, Penghawar).

Dry socket pastes and liquids, made by various manufacturers, can be used and placed directly in the socket alone or using absorbable products such as Gelfoam. Algovyl® (Septodont) is a fibrous product that can be placed and left in the socket. Iodoform packing gauze (Johnson & Johnson) is also available.

Once placed in the extraction socket, the patient will experience profound relief from pain within approximately five to 10 minutes. Generally, anesthesia is not necessary when placing these products.

**Conclusion**

Although the specific topic of extraction complications has been discussed in detail, it is inherent that the dental professional integrate new procedures only after in-depth study and further research.

**References**


Publications; 1986, 272


Author Profiles

Donald Testa, DDS, JD

Dr. Donald Testa obtained his DDS from the New York University College of Dentistry in 1970 and maintained a private practice of oral and maxillofacial surgery at the Fountain Valley Medical Center in Fountain Valley, California, from 1975 to 2000. In addition to being a Diplomate of the American Board of Oral and Maxillofacial Surgeons, Dr. Testa is also a Fellow of the American Association of Oral and Maxillofacial Surgeons, Fellow of the American College of Oral and Maxillofacial Surgeons, Fellow of the Western States Association of Oral and Maxillofacial Surgeons, Fellow of the California Association of Oral and Maxillofacial Surgeons, and Fellow of the American Society of Dental Anesthesia, and he holds membership in numerous other professional dental organizations, including the American Dental Association and the Orange County Dental Society. He has served as a consultant to the Long Beach Veterans Administration Hospital (where he was also a resident surgeon for three years) and the University of California, Irvine Medical Center, and was chief of the Division of Maxillofacial and Oral Surgery in the Department of Surgery at Fountain Valley Regional Hospital from 1980 to 2000. Dr. Testa is also a practicing attorney, having received his Juris Doctor from Pacific Coast University School of Law in 2000 and his Latin Law Master (Magna Cum Laude) in taxation from Pacific West College of Law in 2004, and he maintains his own legal practice in Huntington Beach, California (www.equal-justice-underlaw.com). He has previously been published in the Journal of the American Dental Association and the Orange County Bar Association.

Michael Florman, DDS

Dr. Florman received his dental degree from the Ohio State University and completed his post graduate training in Orthodontics at New York University. Dr. Florman is a Diplomate of the American Board of Orthodontics, and has been practicing dentistry since 1991. He is highly respected as both an orthodontist and an educator. He has authored over forty scientific publications in the field of dentistry and medicine. Dr. Florman is the Executive Program Director for PennWell, a national dental continuing education organization. He is also an active clinical advisor to many pharmaceutical and dental companies. He is a member of the American Dental Association, California Dental Association, and the American Association of Orthodontists. His hobbies include golf, running, hiking, bicycling, photography, and computer graphic design.

Acknowledgements

Cover images courtesy of Dr. Bach Le and Dr. Jay B. Reznick.

Disclaimer

The authors of this course have no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

Reader Feedback

We encourage your comments on this or any PennWell course. For your convenience, an online feedback form is available at www.ineedce.com.
Questions

1. A proper pre-operative examination should include all of the following, except:
   a. A thorough dental history
   b. A thorough pharmacological history
   c. A complete radiographic exam
   d. All of these should be part of the pre-operative process

2. Difficult root morphology describes roots which:
   a. Exhibit hypocementoses
   b. Have been abraded
   c. Are ankylosed
   d. Are radio-necrotic

3. The purpose of the blood clot that forms over the extraction site is to:
   a. Prevent food and debris from entering the site
   b. Protect the underlying bone
   c. Inhibit the development of granulation tissue
   d. All of the above

4. After the clot has formed, a protective covering is formed by:
   a. Leucocytes
   b. Epithelium
   c. Osteoclasts
   d. Lamina dura

5. Disruptive forces which may interfere with primary wound closure include:
   a. Speech
   b. Interference from osteoclasts
   c. Lateral pressure caused by adjacent teeth
   d. All of the above

6. According to the article, the five main groups of drugs which promote bleeding are aspirin, anticoagulants, chemotherapeutic agents, broad-spectrum antibiotics, and:
   a. Alcohol
   b. Nicotine
   c. Narcotics
   d. Stimulants

7. Aspirin and aspirin-containing products promote bleeding by:
   a. Inhibiting the production of vitamin K
   b. Inhibiting production of liver-dependent coagulation factors
   c. Interfering with platelet function and bleeding time
   d. Reducing the number of circulating platelets

8. Chemotherapeutic agents promote bleeding by:
   a. Inhibiting the production of vitamin K
   b. Inhibiting production of liver-dependent coagulation factors
   c. Interfering with platelet function and bleeding time
   d. Reducing the number of circulating platelets

9. Broad-spectrum antibiotics promote bleeding by:
   a. Inhibiting the production of vitamin K
   b. Inhibiting production of liver-dependent coagulation factors
   c. Interfering with platelet function and bleeding time
   d. Reducing the number of circulating platelets

10. Complete hemostatic control can usually be maintained by using direct pressure over the area of soft tissue.
    a. True
    b. False

11. When bleeding occurs from isolated vessels within the bone, the socket should be covered with a moistened gauze sponge.
    a. True
    b. False

12. According to the article, the patient should be instructed to bite down on this moistened gauze sponge for:
    a. 15 minutes
    b. 20 minutes
    c. 25 minutes
    d. 30 minutes

13. If hemostasis has not been achieved and time is short, it is acceptable to release the patient with a supply of gauze packs and specific instructions.
    a. True
    b. False

14. According to the article, how long after the completion of surgery should the patient’s extraction socket be checked?
    a. 15 minutes
    b. 20 minutes
    c. 25 minutes
    d. 30 minutes

15. The most commonly used hemostatic agent is:
    a. Topical thrombin
    b. Oxidized regenerated methylcellulose
    c. Gelatin sponge
    d. Collagen

16. If a patient experiences secondary bleeding, the dental surgeon should first:
    a. Apply direct pressure for five minutes
    b. Clear the extraction site of all blood and saliva
    c. Administer anesthetic and treat the socket more aggressively
    d. Use a vasoconstrictor

17. If it is determined that the secondary bleeding is generalized, the dental surgeon’s first course of action should be to:
    a. Apply direct pressure
    b. Clear the extraction site of all blood and saliva
    c. Administer anesthetic and treat the socket more aggressively
    d. Use a vasoconstrictor

18. When subcutaneous tissues become collection areas for bleeding, overlying soft tissues will:
    a. Bleed
    b. Appear bruised
    c. Become hypersensitive
    d. Feel unusually warm

19. Ecchymosis occurs most frequently in which demographic?
    a. Teenagers
    b. Heavy alcohol users
    c. The elderly
    d. b and c

20. Ecchymosis is best prevented by:
    a. Applying moist heat
    b. Reducing trauma
    c. Using a vasoconstrictor
    d. Broad-spectrum antibiotics

21. Delayed wound healing is most commonly caused by:
    a. Infection
    b. Dietary deficiencies
    c. Ecchymosis
    d. Oro-antral fistula formation

22. Alveolar osteitis is more commonly known as:
    a. Ecchymosis
    b. Radio-necrotic bone
    c. Paget’s disease
    d. Dry socket

23. Alveolar osteitis is usually characterized by:
    a. Exposed bone
    b. A foul taste and odor
    c. A partially or completely lost blood clot
    d. All of the above

24. The average rate of incidence of alveolar osteitis in all extractions is:
    a. 0.3 percent
    b. 68.4 percent
    c. 3 percent
    d. 30 percent

25. Dry socket is more likely to occur after single extractions than after multiple extractions.
    a. True
    b. False

26. Dry socket occurs most frequently in:
    a. Upper molars
    b. Lower molars
    c. Premolars
    d. Incisors

27. Pre- and post-operative use of antimicrobial mouth rinses has been shown to:
    a. Promote hemostasis
    b. Speed up recovery time
    c. Lower incidence of dry socket
    d. Lower incidence of secondary bleeding

28. Because of its effectiveness against anaerobic pathogens, the most popular drug for preventing dry socket is:
    a. Tetracycline
    b. Clindamycin
    c. Neomycin
    d. Saline

29. When treating dry socket, the first course of action is to:
    a. Curette the socket
    b. Suction the socket
    c. Irrigate the socket with saline
    d. Place a small piece of treated gelatin sponge in the socket

30. Generally, it’s necessary to administer an anesthetic before using dry socket pastes or liquids.
    a. True
    b. False
Complications of Extractions

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all answer sheets in either pen or pencil. 3) Mark only one answer for each question. 5) A score of 70% on this test will earn you 4 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp.

Educational Objectives

1. Understand the components of careful evaluation and planning to reduce risks when performing extractions
2. Understand factors that tend to increase the difficulty of extractions
3. Understand protocols to prevent problems resulting from extractions and the necessity of investigating patients' health histories
4. Understand the challenges of bleeding—dangers of hemorrhaging, causes of bleeding, and hemostatic agents available in the industry to minimize bleeding

Course Evaluation

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

1. Were the individual course objectives met?
   Objective #1: Yes No
   Objective #2: Yes No
   Objective #3: Yes No
   Objective #4: Yes No

2. To what extent were the course objectives accomplished overall?
   5 4 3 2 1 0

3. Please rate your personal mastery of the course objectives.
   5 4 3 2 1 0

4. How would you rate the objectives and educational methods?
   5 4 3 2 1 0

5. How do you rate the author's grasp of the topic?
   5 4 3 2 1 0

6. Please rate the instructor's effectiveness.
   5 4 3 2 1 0

7. Was the overall administration of the course effective?
   5 4 3 2 1 0

8. Do you feel that the references were adequate?
   Yes No

9. Would you participate in a similar program on a different topic?
   Yes No

10. If any of the continuing education questions were unclear or ambiguous, please list them.

11. Was there any subject matter you found confusing? Please describe.

12. What additional continuing dental education topics would you like to see?

Mail completed answer sheet to
Academy of Dental Therapeutics and Stomatolgy,
A Division of PennWell Corp.
P.O. Box 116, Chesterland, OH 44026
or fax to: (440) 845-3447

For IMMEDIATE results, go to www.ineedce.com and click on the button "Take Tests Online." Answer sheets can be faxed with credit card payment to (440) 845-3447, (216) 398-7922, or (216) 255-6619.

□ Payment of $59.00 is enclosed.
(Checks and credit cards are accepted.)

If paying by credit card, please complete the following:

Acct. Number: _______________________________  Exp. Date: _____________________

Charges on your statement will show up as PennWell

1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15.

AGD Code 311

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

INSTRUCTIONS

All participants scoring at least 70% on the examination will receive a certificate verifying 4 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/Mastership purposes.

Mail completed answer sheet to

PennWell maintains records of successful completion of any course. Please confirm test scores for a copy of your continuing education credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

P .O. Box 116, Chesterland, OH 44026

© 2008 by the Academy of Dental Therapeutics and Stomatolgy, a division of PennWell.