

## INTRODUCTION

Knowledge about the science of endodontics can be separated from its clinical application. It is possible to technically perform root canal treatment without any knowledge of the science whatsoever. It is equally possible to understand the science completely, yet not understand how to execute the technique. Although one can find several titles related to endodontics, there remains a clear need for an approachable and understandable text about how the process is carried out and how the physical evidence correlates with the theoretical and technical framework. This book attempts to do that.

This book is a teaching tool as much as a learning tool. Many techniques described in these pages are neither original nor novel. Most of the ideas and concepts are derived from the volumes of clinical research and textbooks available to all. This book merely presents an interpretation of those ideas and concepts, arranged systematically and logically. This book simplifies a complex process. It is for those who want to understand endodontics more deeply from the perspective of a clinically practicing endodontist.

There are known limitations in the techniques. Our models have a strong congruence with the knowledge of integrated biological systems and their relationship to external variables; that is why the clinical practice of endodontics continues to produce mostly favorable results. However, our current models fall short of satisfying all we think we understand about the science. They do not explain why some treatments appear to succeed even though they clearly violate our accepted model. We know a tremendous amount about how endodontics works, but not nearly enough.

## HOW THIS BOOK WORKS

### Diagnosis and Case Selection

Diagnosis transcends all disciplines and, when applied correctly, leads to the most likely conclusion for any given set of preexisting conditions. I present here the core of endodontic diagnostic theory in a form suitable for both critical thinking and logical decision-making. I do not address abstract circumstances, nor do I discuss the prognosis or treatment recommendations for previously root canal-treated teeth. Readers interested in endodontic retreatment or surgical root canal treatment must refer to other titles that discuss these topics in greater detail.

This volume aims to provide guidance on how to adopt and execute a strategy for diagnosis and case section. It will focus on the fundamentals that influence the decision-making attitudes of the treating clinician. Thirty-five unique systems have been assembled and organized in a coherent sequence to distill the diagnostic process into its simplest form. Each system is composed of an interconnected set of elements that act as driving factors within the system. The systems explore a number of scenarios that lead to the most likely conclusion, outcome, or option when the influencing variables applied to the driving factors are different.

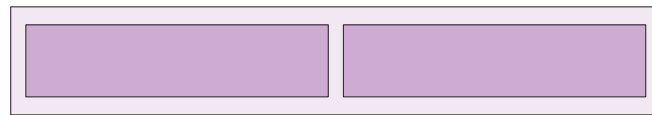
## Elements

- Elements make up the building blocks of every system.
- An element can be an action, a reaction, an observation, a conclusion, a measurement, a sensation, an interpretation, an event, or an object.



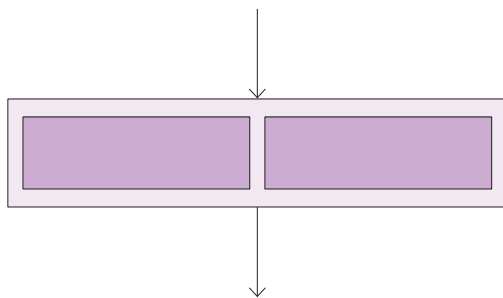
***Element***

- Two or more elements that drive the system in the same direction will appear as merged elements; once united, they act together as a single element.

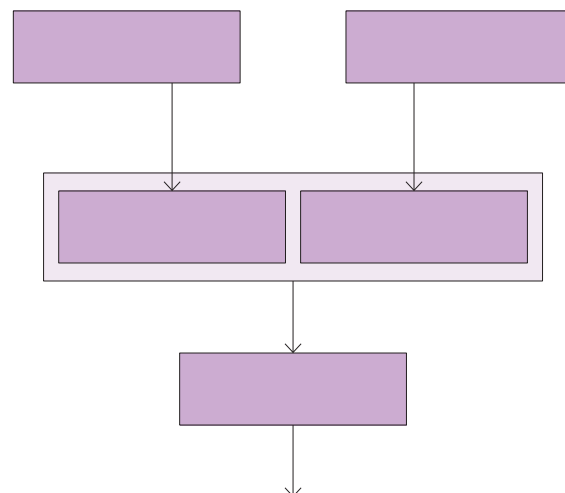


***Merged Element***

- Merged elements can be inherent or develop within the system.

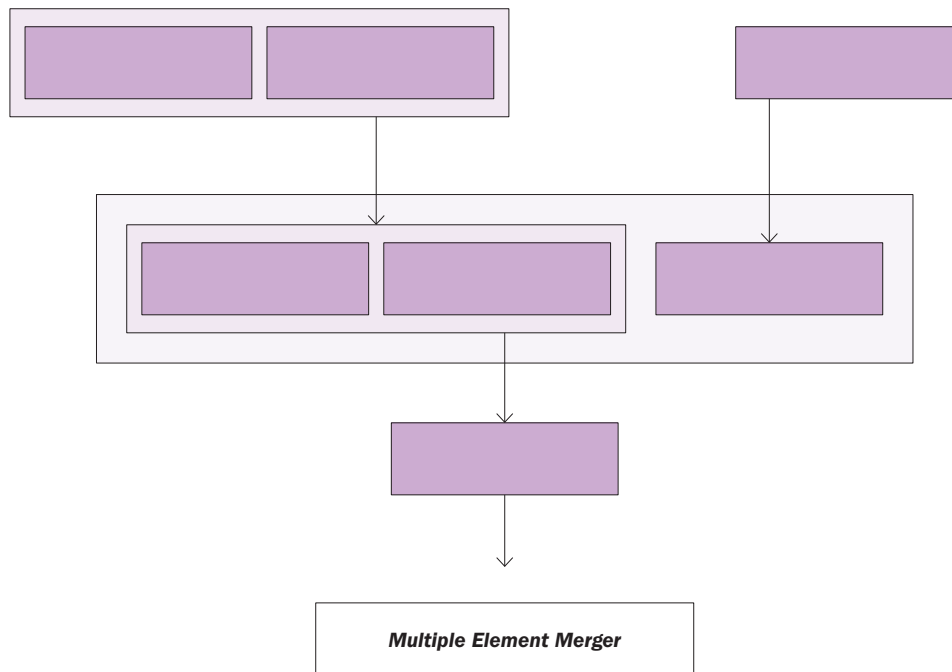


***Inherently Merged Element***

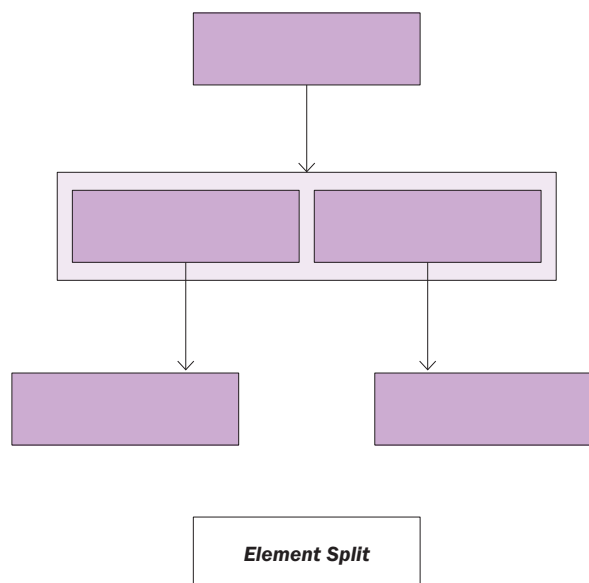


***Elements Merging within a System***

- Elements may continue to merge, so long as their mutual relationship share the same driving factors.

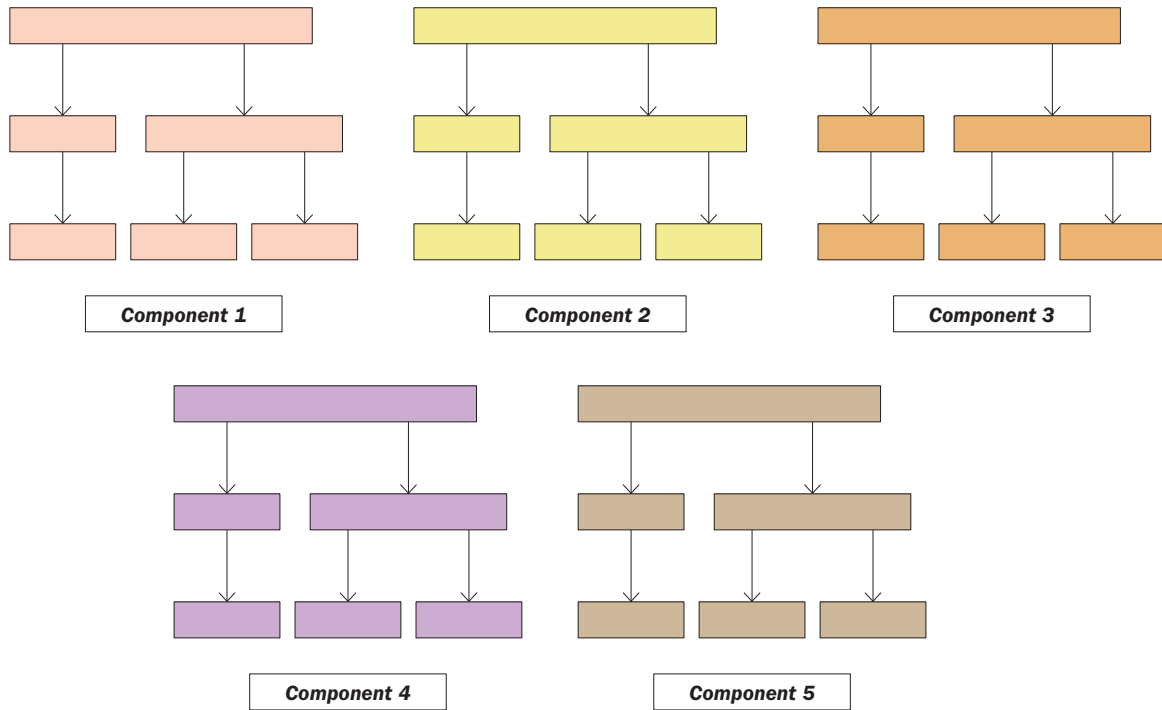


- Merged elements that no longer share the same driving factors can split and move the system in different directions.

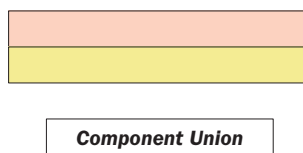


# Components

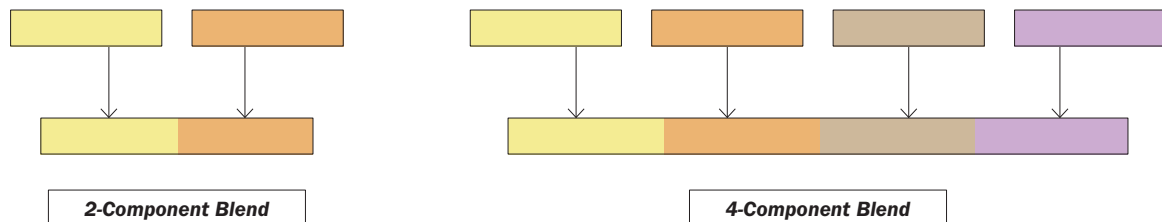
- Elements are arranged into color groups of organized thought processes called components.
- Components have a beginning and an end.



- Components connect via shared elements in a component union.
- A component union signifies the end of one thought process and the beginning of another.

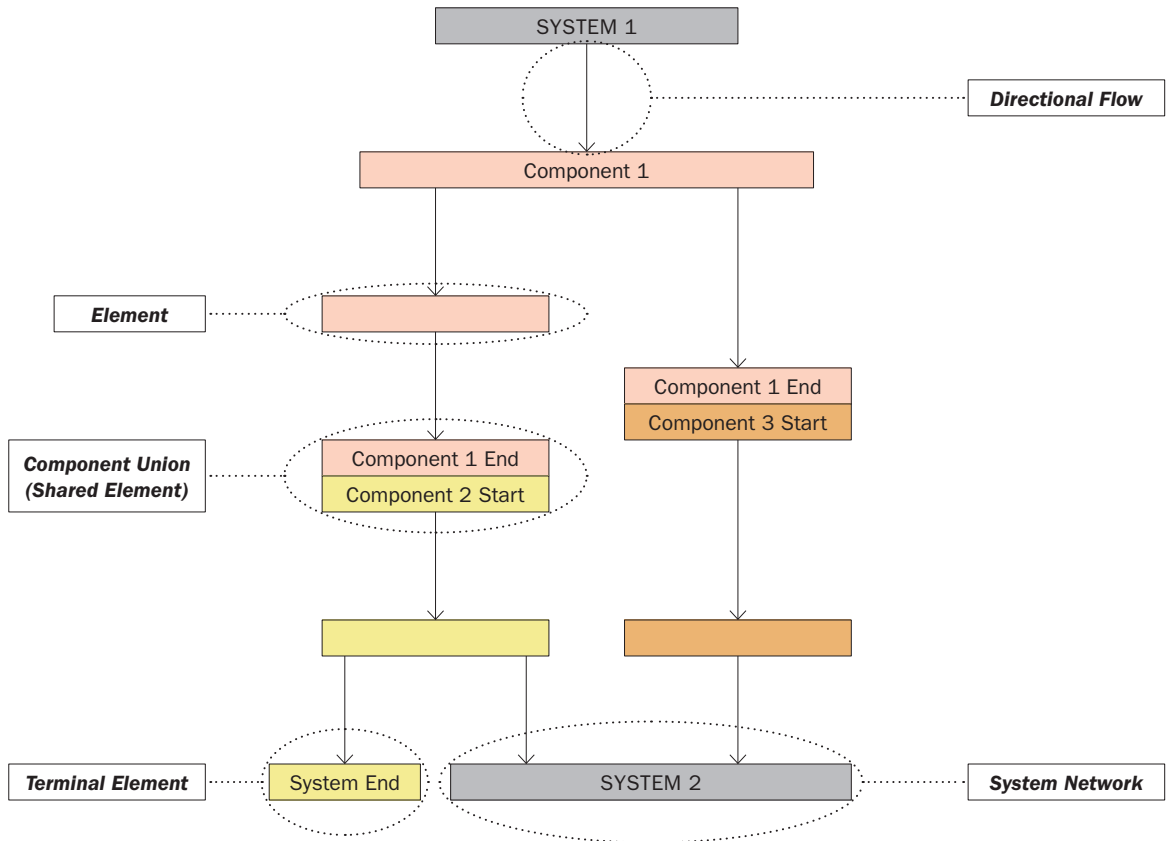


- Two or more components that share the same element can merge and create a component blend.
- A component blend will behave as a single element.

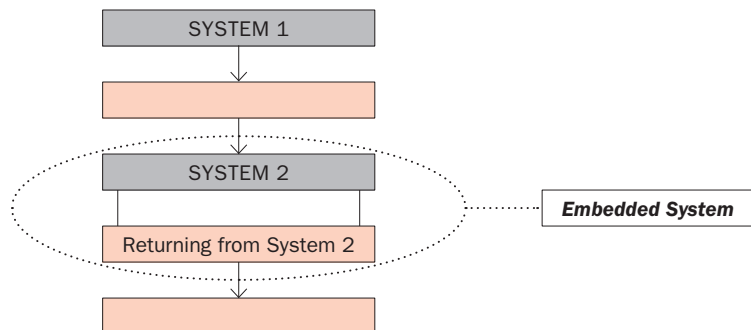


# Systems

- A system is a collection of one or more components governed by the directional flow of its elements.
- A system will end with a terminal element or prompt a continuation to another system.

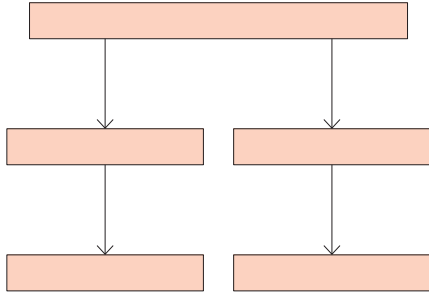


- A system can be embedded within a system.
- When information from another system is required to drive the current flow, the reader will be directed to a different system.
- The new system should be followed until the reader is prompted to return to the system from which they came.

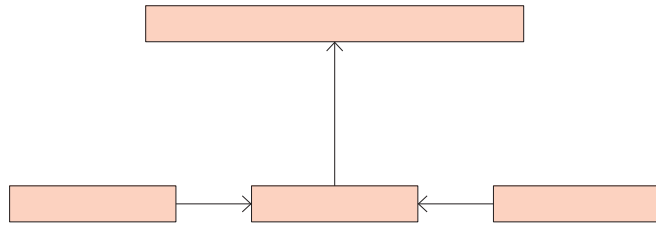


# System Flow

- Most systems will flow in a downward direction. However, the flow can move upward, to the right, or the left.

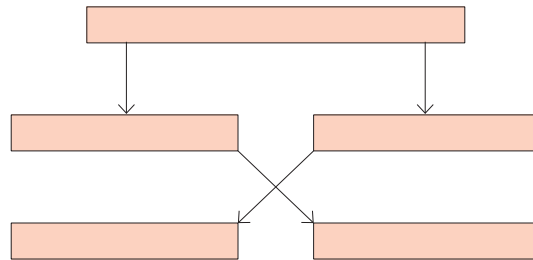


**Downward System Flow**



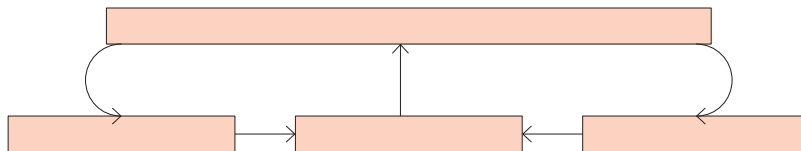
**Multidirectional System Flow**

- The system flow can cross.



**Crossing System Flow**

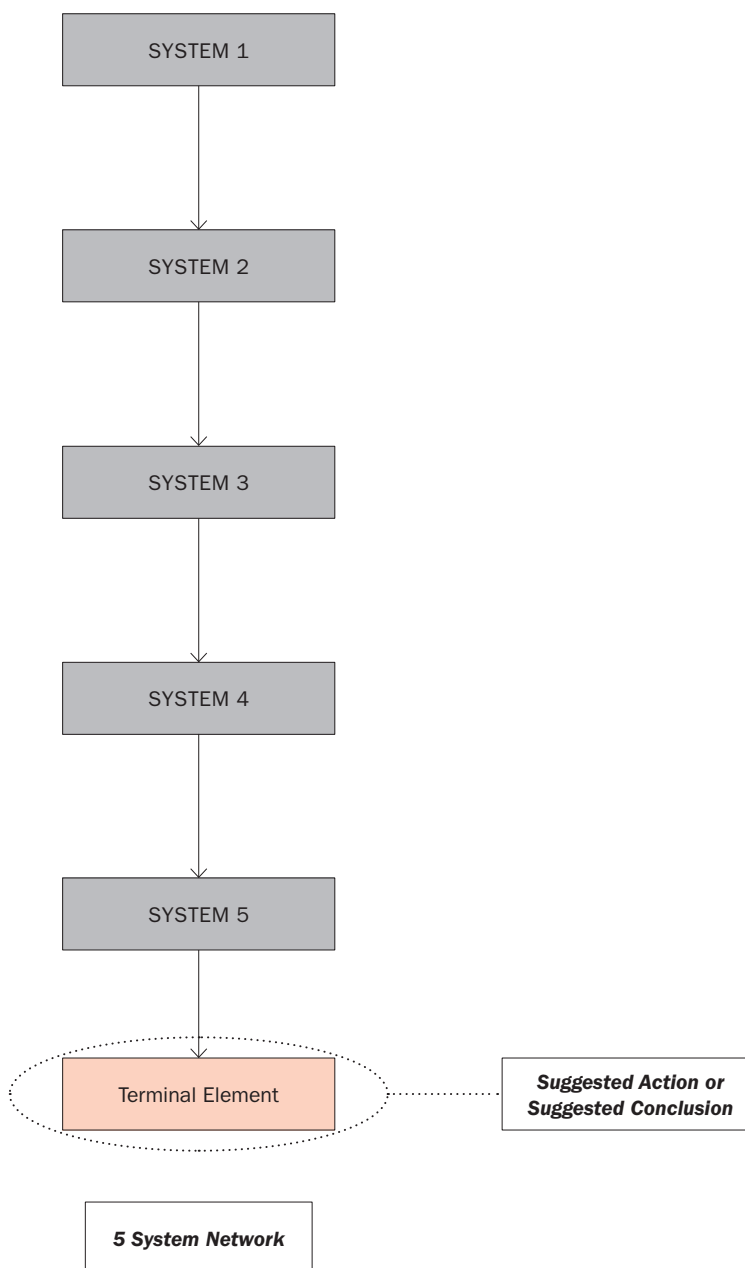
- The system flow can cycle.



**Cycling System Flow**

## Network

- The sequential continuation of two or more systems (used in association with each other) comprises a system network.
- A network can begin with any system and will end with a terminal element.
- The terminal element will represent a suggested action or reach a suggested conclusion.
- The reader must analyze the information within the network and choose to accept or reject the suggested terminal element.

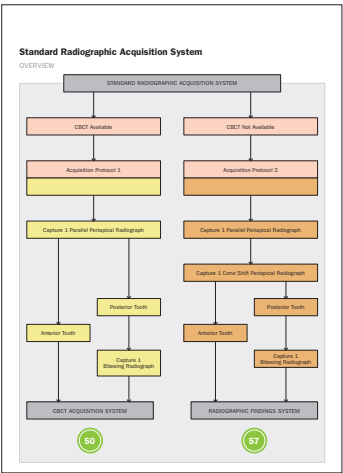




# The Layout

## System Overview

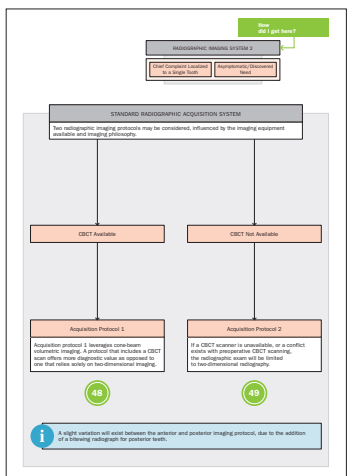
- An overview of each system is displayed, showing the title of the system, all connections between its components, and the directional flow of its elements.
- The system overview can be used as a stand-alone reference.



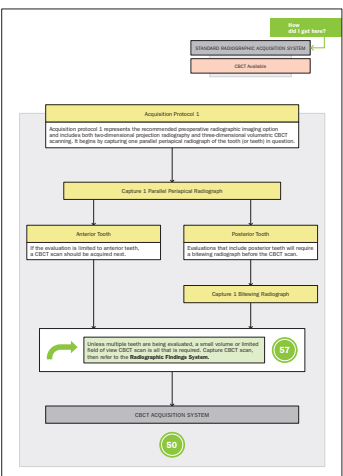
System Overview Page

## Component Analysis

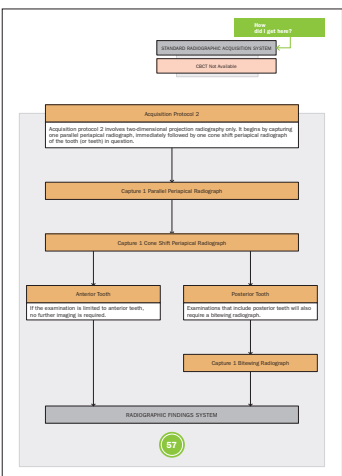
- The pages following the system overview provide a detailed analysis of each component and the relationship between its elements.
- The reader must evaluate each element's merit and choose a directional flow that best reflects their given clinical scenario.



Component 1

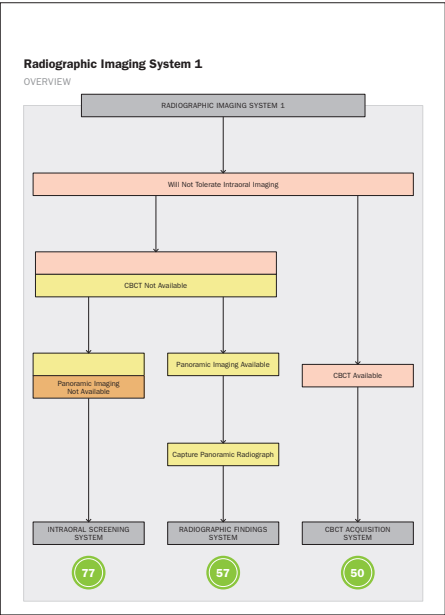


Component 2

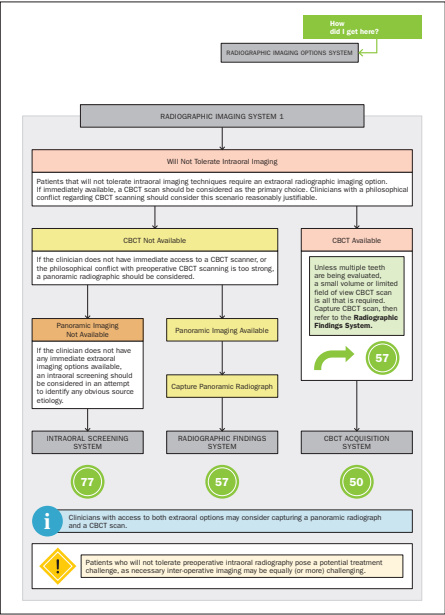


Component 3

• Multiple component analysis may appear on the same page.



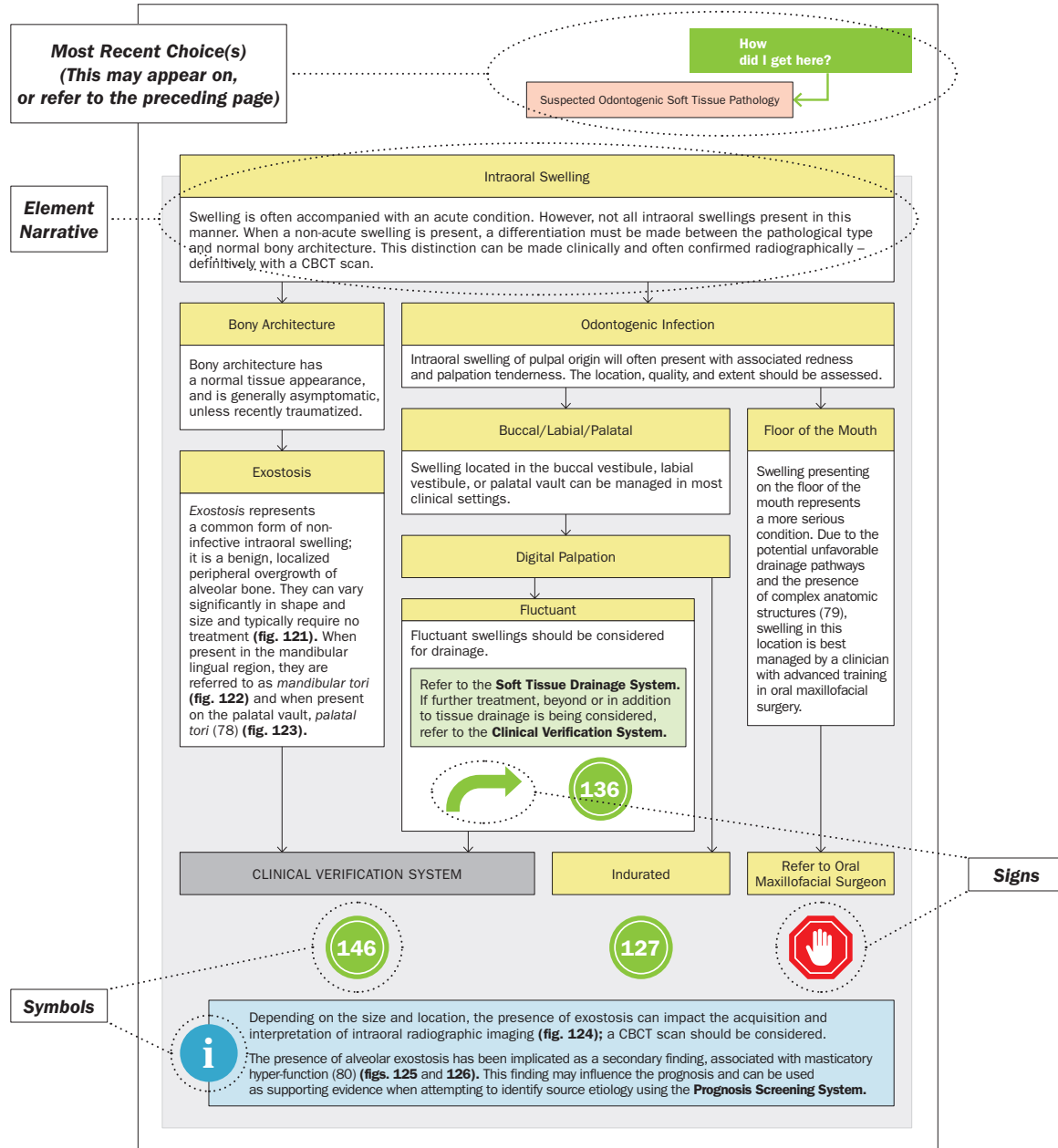
**System Overview**



**Multiple Component Analysis Page**

## Page Features

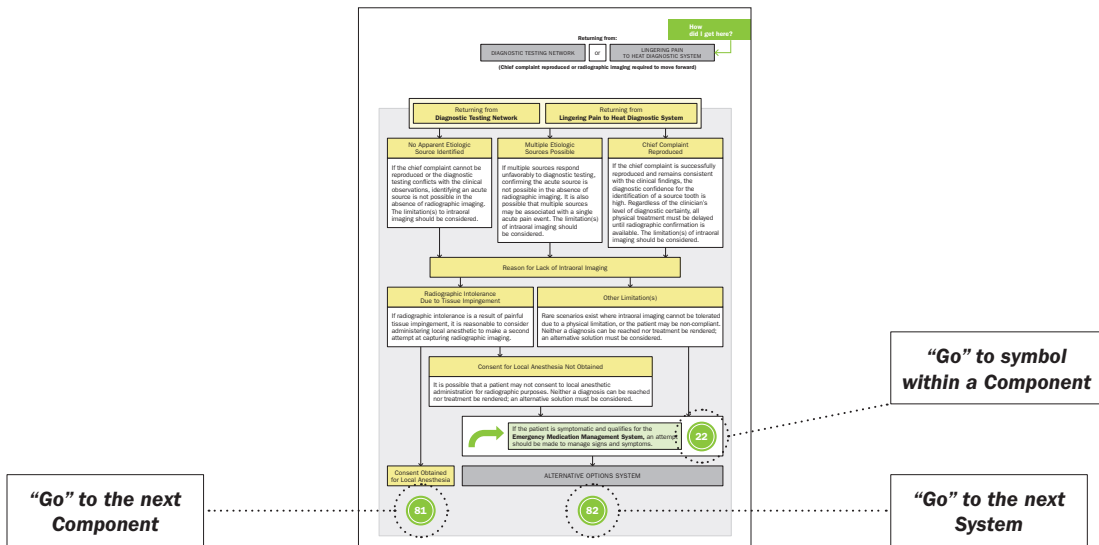
- Page navigation features allow the reader to easily reference the working system, and understand the element choices leading to the current page.
- A narrative or rationale is provided for the element when further explanation or clarification is required.
- Signs and symbols offer visual clues and cues to guide the reader through the system (and network) efficiently.



# Signs and Symbols

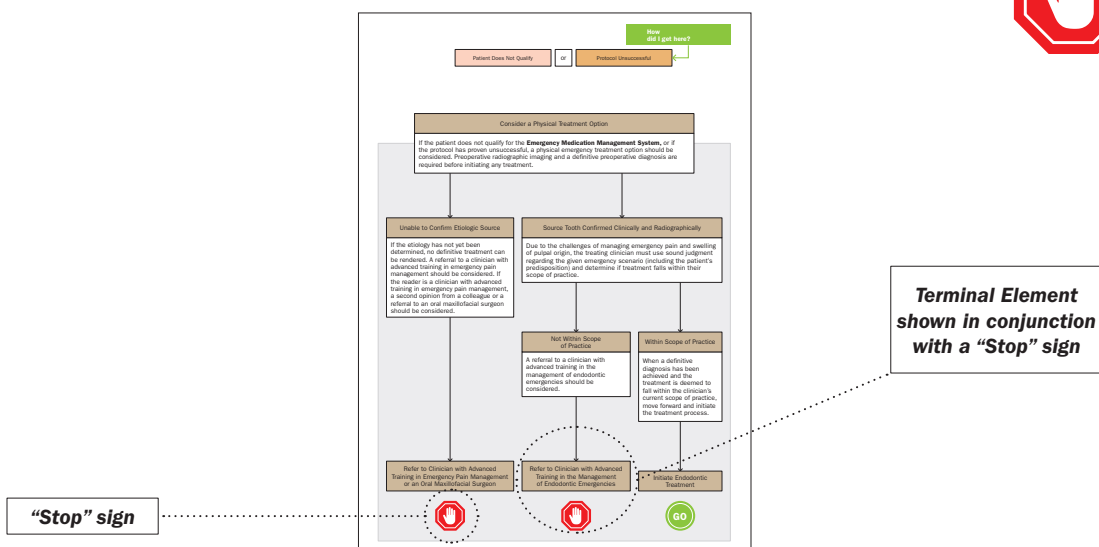
## Go Symbol

- Signifies a progression of the system or network; the reader is prompted to turn to the corresponding page number.
- The reader can be moved forward or backward within the text.
- A “Go” symbols can appear anywhere on the page.
- When the “Go” symbol reads “GO”, the reader is prompted to move forward with treatment.



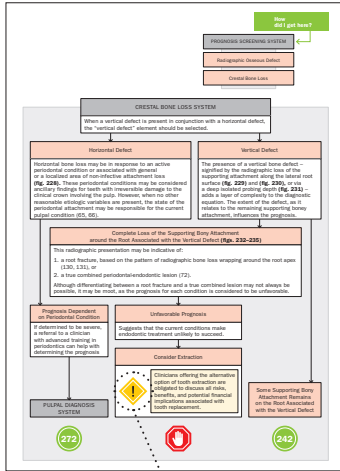
## Stop Sign

- A “Stop” sign signifies the end of a network and a termination of the current process.

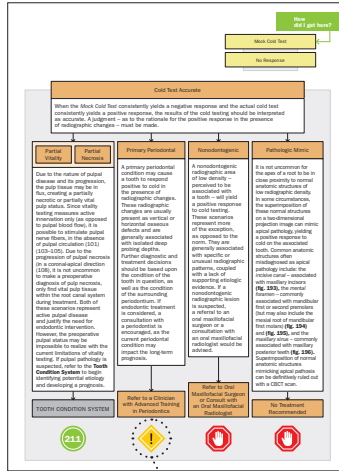


## Caution Sign

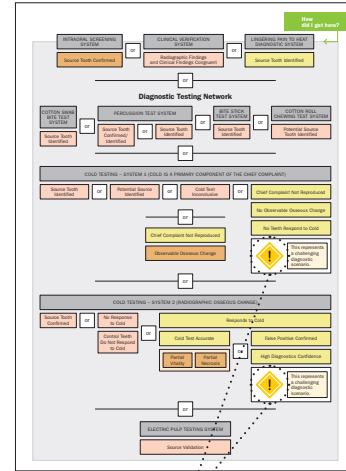
- Signifies a scenario where the reader must exercise careful clinical judgment before moving forward; they may occur anywhere within the network.



**“Caution” sign within an Element Narrative**



**“Caution” sign associated with a Terminal Element**



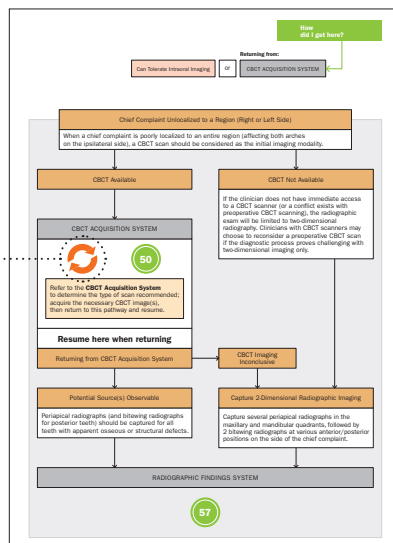
**“Caution” signs associated with Page Navigation**

## Detour Sign

- Associated with embedded systems, a “Detour” sign acts as a visual cue prompting the reader to a different system, with the expectation that the reader will return to the current system.

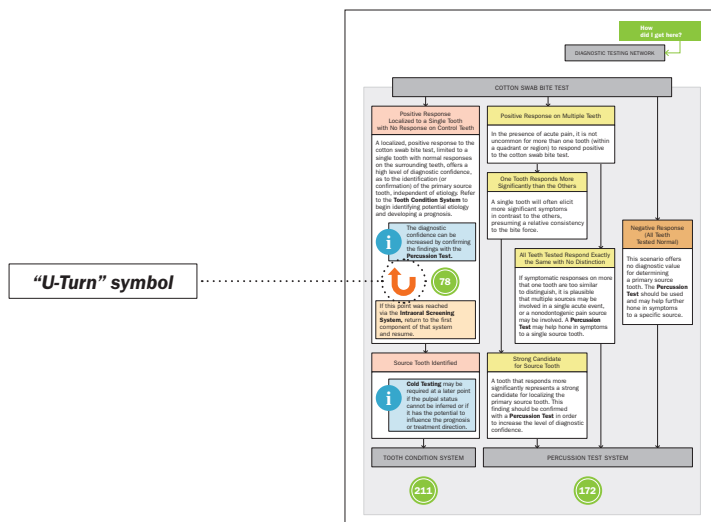


**“Detour” sign within an Embedded System**



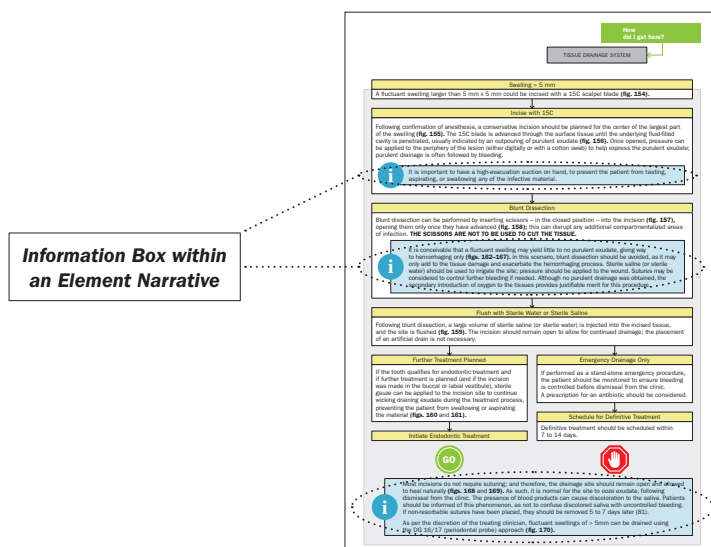
## U-Turn Symbol

- Acts as a visual cue prompting the reader to return to the previous system; they are associated with “Detour”.



## Information Box Symbol

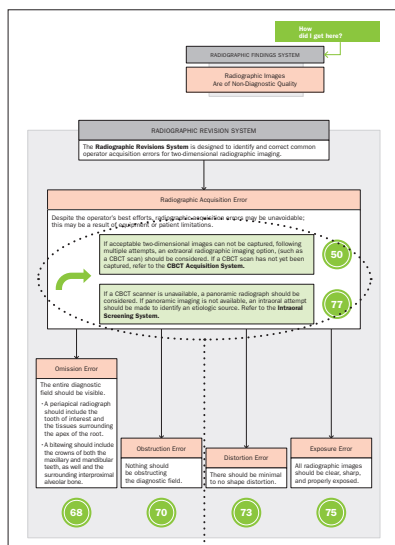
- Provides further dialogue related to the element, component, or system. They can be found within an element narrative or located on the outside of the system.



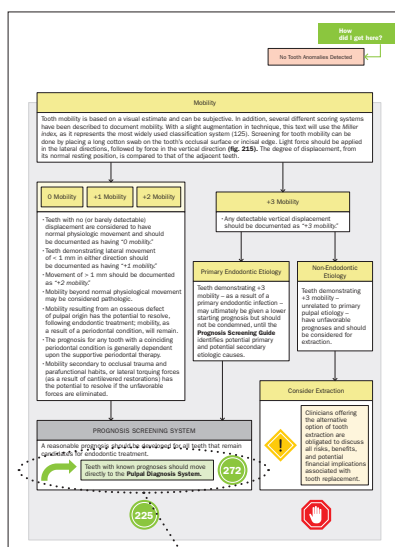
**Information Box outside the System**

## Shortcut Sign

- Allows the reader to skip a portion of a system or jump to a different system within a network.
- They are intended to be used when:
  - 1) specific clinical conditions are met (as indicated by the associated dialogue box)
  - 2) there is a prior understanding of the established process.
- They can be associated with a specific element, an entire component, a system network, or appear within the system flow.



“Shortcut” associated with an Element



“Shortcut” associated with a Network

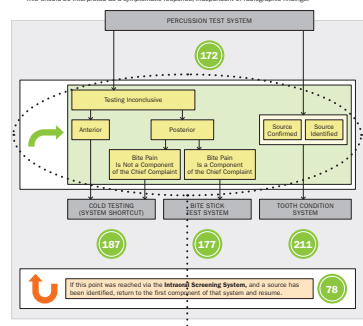
## Percussion Test

**Purpose:** Used to determine the presence or absence of localized periradicular inflammation through direct stimulation of sensory nerve fibers associated with the periodontal ligament (PDL).

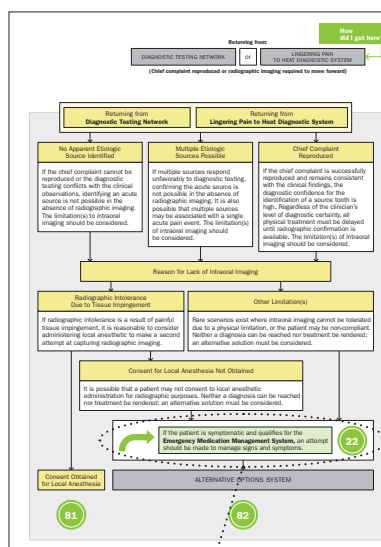
**Method:** A flat-ended metal instrument (often, the back of a mirror handle) is gently tapped on the occlusal (or incisal) tooth surface (Fig. 185). The reaction is observed, and verbal description of the sensation is reported.

### Interpretation and Documentation:

- A tooth experiencing no response, other than the perception of pressure, should be interpreted as having no acute inflammation of the periradicular tissues – documented as “negative to percussion”.
- In the absence of radiographic pathology, this would be considered a normal response.
- In the presence of radiographic pathology, this would be considered an asymptomatic response.
- A tooth experiencing any response, beyond the perception of pressure, should be interpreted as having acute inflammation of the periradicular tissues documented as “positive to percussion”.
- This should be interpreted as a symptomatic response, independent of radiographic findings.



“Shortcut” associated with a Component



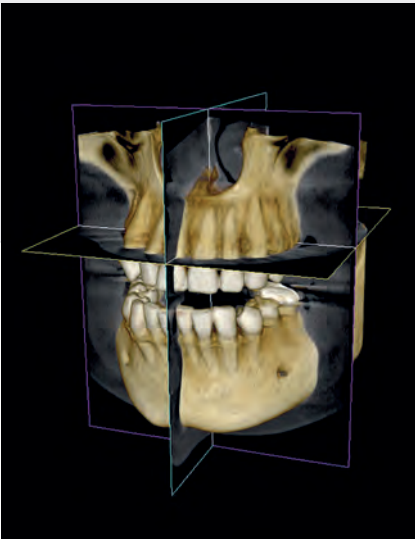
“Shortcut” within the System Flow

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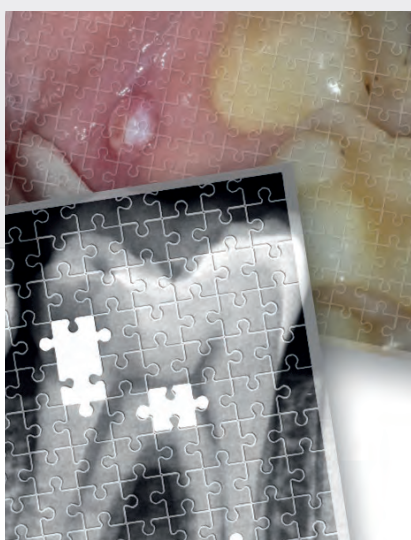


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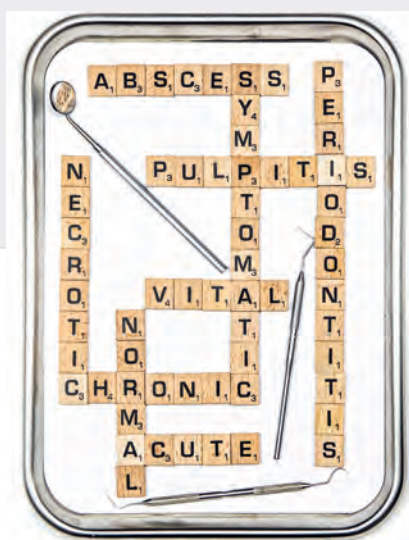
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## CHAPTER 1

# INITIAL EVALUATION AND CHIEF COMPLAINT

In endodontics, an evaluation consists of the systematic determination of the patient's perception of pain and the nature of pathology in relation to the pulpal and periapical tissues. A patient who requires endodontic treatment will often present with specific signs and symptoms that are unmistakably pulpal in origin. Other times, however, the signs and symptoms may be vague or completely nonexistent.

### The Chief Complaint and the Perception of Pain

On occasion, pulpal or periapical disease may be detected during routine dental examinations. More often, the development of objectionable signs and symptoms prompts the patient to seek treatment at random, unplanned intervals. In the latter scenario, the patient needs to describe their perceptions of the condition in a manner that accurately expresses their current situation. This expression comes in the form of a *chief complaint*.

Pain is one of the main reasons that patients actively seek out dental treatment (1, 2). A patient's chief complaint either includes the description of some level of perceived pain or not. Patients perceiving any degree of pain are considered to be *symptomatic*, while those who do not experience pain are *asymptomatic*.

The chief complaint is a concise statement that describes the patient's symptoms, problems, conditions, or other reasons for the dental encounter. It should be stated in the patient's own words. The chief complaint guides diagnostic decision-making and treatment recommendations. In most circumstances, the chief complaint focuses on the perception of pain, soft tissue changes, or changes to the tooth structure itself.

The perception of and reaction to pain are subjective and influenced by genetic, developmental, familial, psychological, social, and cultural variables (3). Pain can be referred across neural pathways and affect other regions. Odontogenic pain will not cross the midline, as it follows the distribution pathways of the trigeminal nerve (4). To fully comprehend the significance and nature of the perceived pain event from the patient's perspective, it must be qualified and quantified.



### Qualifying and Quantifying Pain

Qualifying pain characterizes it by describing its nature. Pain can either be sharp or dull, localized or unlocalized, and radiating or non-radiating. These descriptors are generally used in association with each other and various combinations. They provide a complete, well-defined portrait of the perceived pain event. For example, the pain event can be described as sharp, localized, and non-radiating.

Quantifying pain is a way to describe its degree and measure its perceived value, and it is accomplished by gauging intensity, frequency, and duration of the pain.

- The perceived intensity of pain can be measured using the *visual analog scale* (VAS) method. The VAS is a subjective method of scoring pain across a continuum of values, ranging from “no pain” to “worst pain” (5, 6). The most straightforward use of the VAS is to have patients describe the intensity of their pain on a scale of 0 to 10 (0 being “no pain” and 10 being “the worst pain possible”). Because the VAS rating is subjective, this value can differ significantly between individuals suffering from the same condition. It should be used only as a general guideline to understand the patient’s perceived level of pain.
- The frequency of pain refers to the number of times pain occurs in relation to a fixed period of time, such as, for example, once every minute, once every hour, once every day, rarely, or constantly. Furthermore, the frequency may be spontaneous or occur only when stimulated.
- The duration of pain refers to how long a specific instance of pain lasts, for example, seconds, minutes, hours, or remains constant. When pain is present over an extended period, it is often referred to as *lingering*.

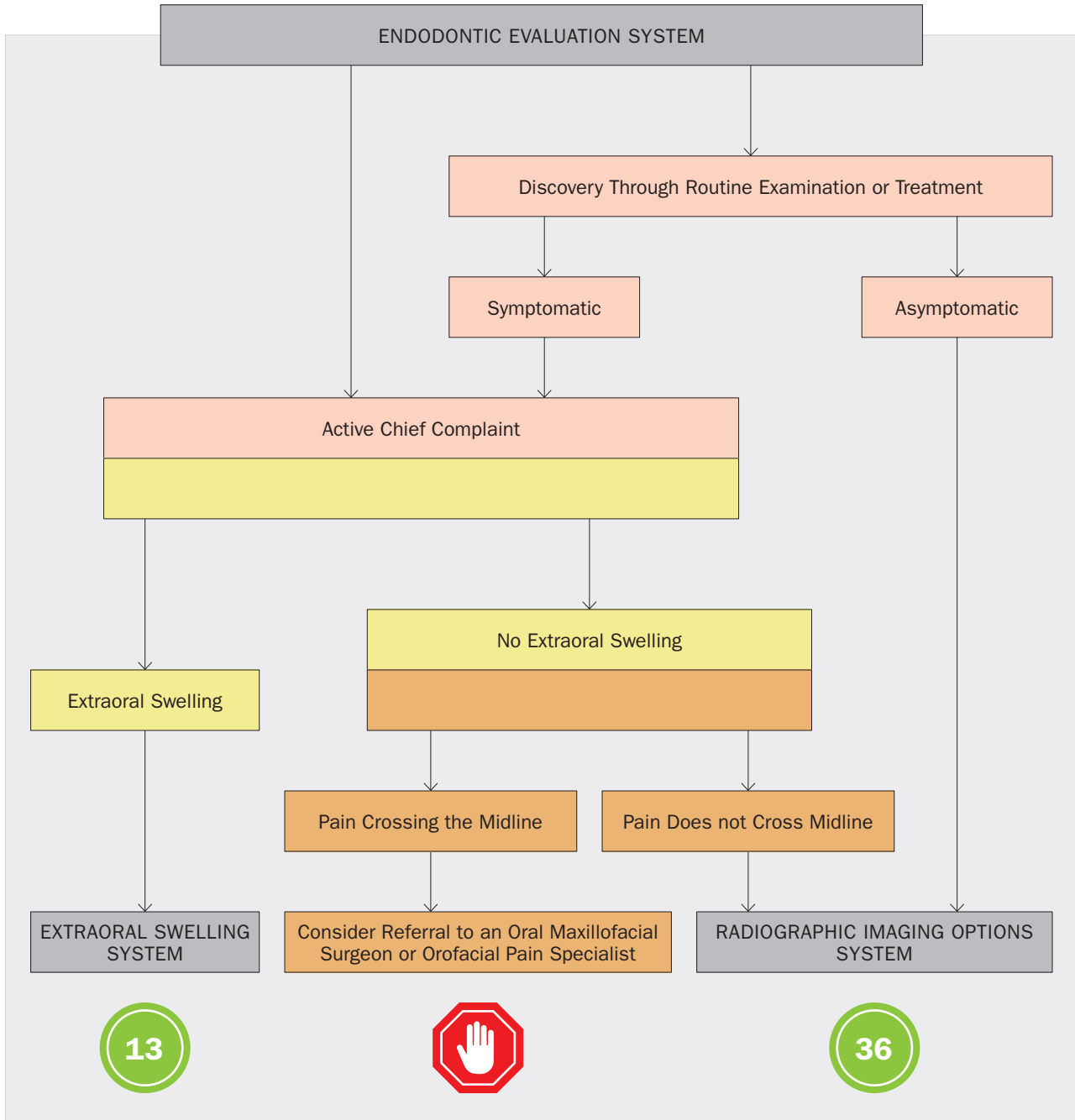
When attempting to understand the nature of pain, the clinician can find it valuable to determine the methods and medications used to alleviate it. Some methods, such as bathing the affected tooth with cold water, can indicate late-stage pulpal inflammation or early pulpal necrosis, whereas relief from prescription antibiotics implies a bacterial component. These findings may be considered an empirical measure and can influence future diagnostic choices.

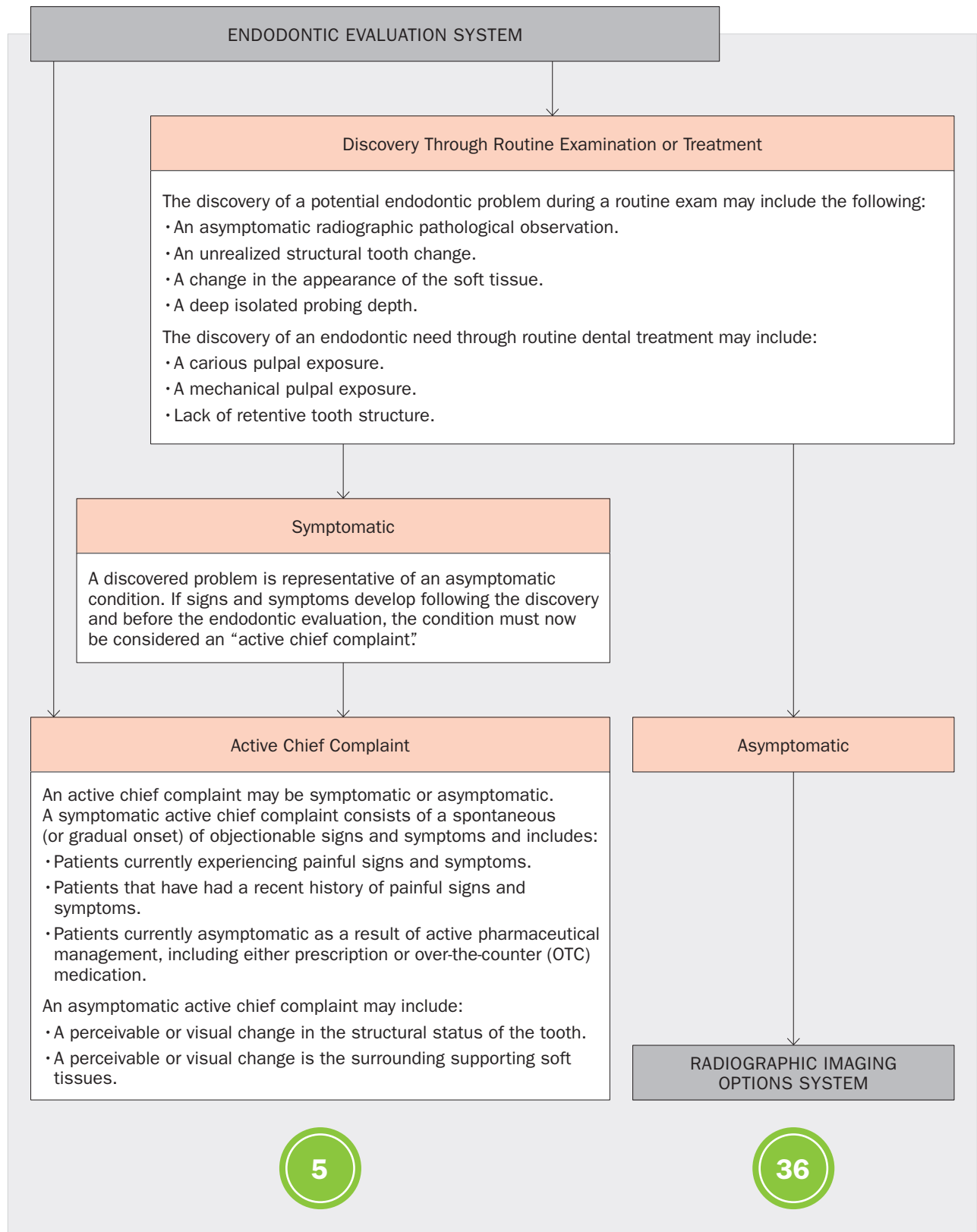
The clinician can gather this information efficiently, effectively, and concisely with the aid of the **Patient Subjective Examination Questionnaire**. The form is designed with specific questions that target the fundamental qualifiers and quantifiers of pain. The questions are designed to be asked in an interview format, with an area to document answers in a manner that promotes active listening. This task can be delegated to a clinical team member. Once the form has been completed, the information it contains can be presented to the clinician, for whom it can provide a thorough understanding of the patient’s perceived problem before encountering the patient. The ability to understand and reiterate the perceived problem builds instant rapport, trust, and confidence. An example of the **Patient Subjective Examination Questionnaire** can be found in the appendix section of this book (page 290).

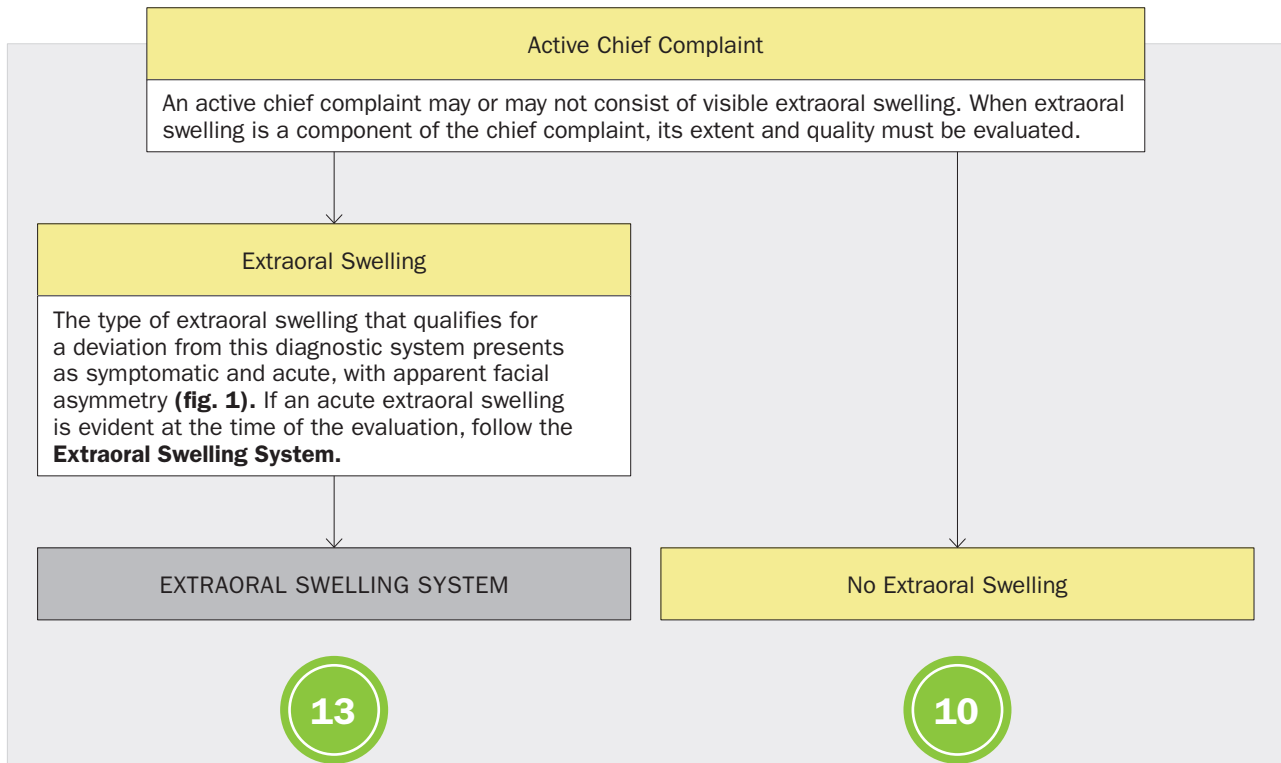
# Reason for Endodontic Evaluation System

## OVERVIEW

**i** This system is used for initial triage purposes. It directs patients with acute extraoral swelling to an entirely separate evaluative system and identifies clear nonodontogenic conditions.







Extraoral swelling is an objective clinical observation, as determined by the treating clinician. It is not uncommon for a patient to state that they “feel swollen” (or believe that they are currently swollen) in situations where the extraoral evaluation reveals no remarkable or outward visual changes. A patient’s perception as to the appearance of their face can be sensitive; any slight change can be perceived as extraoral swelling. It is also possible that the patient was swollen at one point during the disease progression, and the swelling has since subsided, but the residual effects remain.

#### **Odontogenic Cutaneous Sinus Tract (figs. 2 and 3)**

Often misdiagnosed and ineffectively treated, odontogenic cutaneous sinus tracts mostly appear at the mandibular angles, chin, and cheeks. They are typically characterized as asymptomatic, erythematous, crusty nodules with periodic drainage (7). Governed by the position of the root(s), and their relationship to the cortical plate and the facial muscle attachments, cutaneous sinus tracts represent an extraoral manifestation of a chronic periapical infection. They usually resolve following removal of the causative etiology.

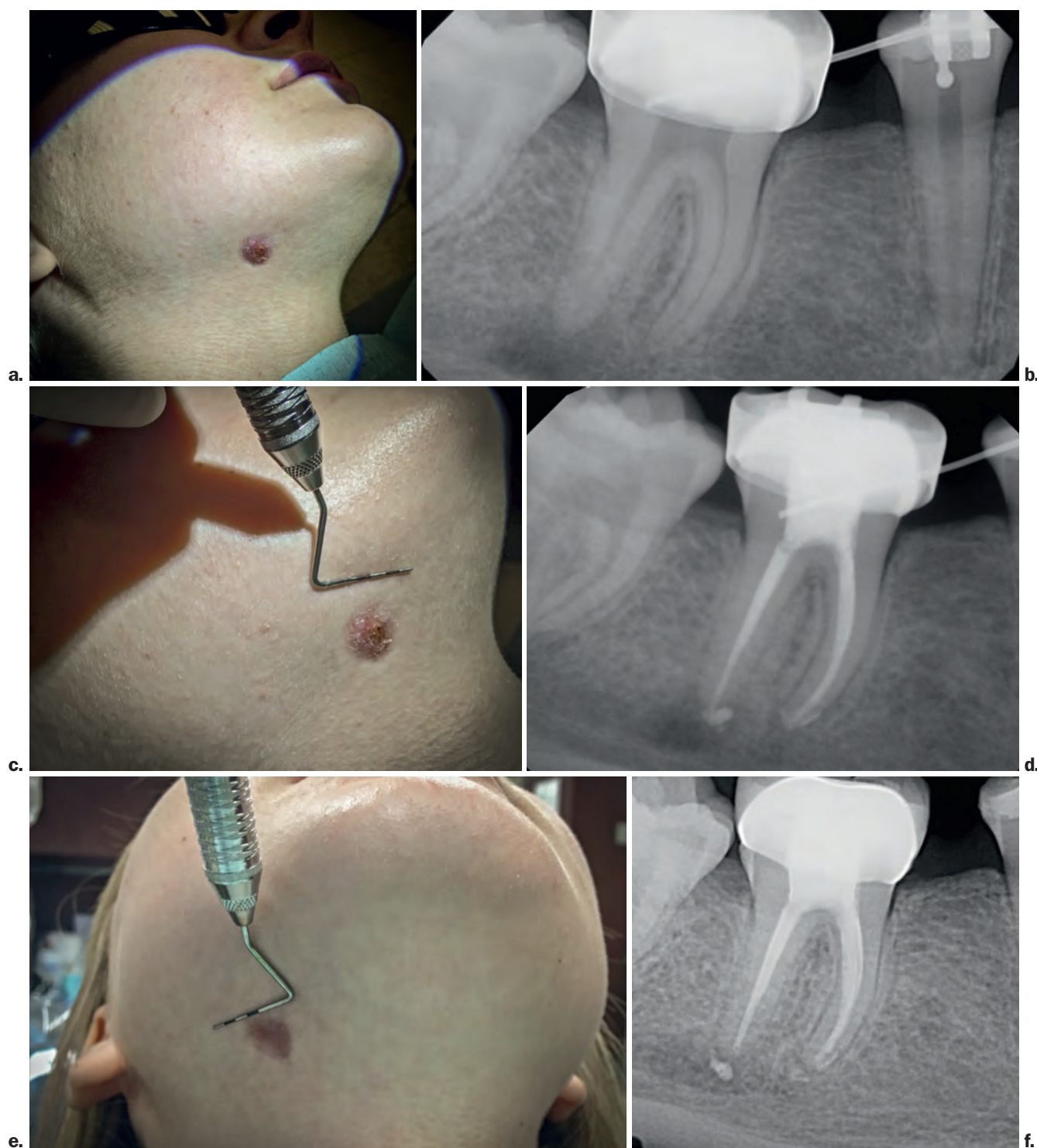
#### **Herpes Zoster (fig. 4)**

Often referred to as shingles, herpes zoster is a painful skin rash caused by a reactivation of the varicella-zoster virus. Following the primary varicella infection (chickenpox), the virus can establish latency in cranial nerve ganglia. If reactivated, the virus will spread to the dermatomes of the associated ganglion. When the infection is associated with the trigeminal ganglion, the facial nerve is often affected. The only presenting symptom may be odontalgia during the prodromal stage, leading to a challenging diagnostic scenario. A definitive diagnosis of herpes zoster can be made in the presence of neurocutaneous lesions (8).



**Figure 1.** Maxillary left buccal space swelling, representing the type of extraoral swelling that qualifies for the **Extraoral Swelling System**. Note the facial asymmetry and redness under the left eye.





**Figure 2.** Odontogenic cutaneous sinus tract (measuring approximately 10 mm by 10 mm) present at the right mandibular line angle, and periapical radiograph of the mandibular right first molar demonstrating a radiolucency associated with the distal root **(a)**, **(b)**, and **(c)**. Nonsurgical endodontic treatment performed **(d)**, resulting in the resolution of the odontogenic cutaneous sinus tract. Note the scar tissue formation **(e)**. Periapical radiograph, 16 months after endodontic treatment, demonstrating complete osseous healing **(f)**. (Case courtesy of Dr. Cynthia Czaperacker, University of Illinois college of dentistry department of endodontics, Chicago, Illinois.)



**Figure 3.** Odontogenic cutaneous sinus tract formations at the left mandibular line angle, causing pain and swelling. Note that extraoral draining has not yet been established **(a)** and **(b)**. Sagittal CBCT slice of the left mandibular first molar demonstrating an area of low density associated with the distal root **(c)**. Coronal CBCT slice of the distal root, demonstrating a discontinuity of the lingual cortical plate (\*) **(d)**. One month post-initiation of nonsurgical root canal treatment **(e)** and **(f)**, the patient chose not to move forward with endodontic treatment, opting for extraction. Note the apical root resorption (arrows).





**Figure 4.** Neurocutaneous lesions associated with Herpes Zoster reactivation. Note the lesions do not cross the midline **(a)** and **(b)**. The facial nerve distribution is consistent with the viral spread along the dermatomes associated with the trigeminal ganglion **(c)**.

Active Chief Complaint

No Extraoral Swelling

Pain Crossing the Midline

An active chief complaint consisting of pain that crosses the midline generally represents a pathognomonic sign of nonodontogenic pain (4). However, it is possible that the patient may be suffering from separate, simultaneous, bilateral dental issues, or may be experiencing a dental issue and nonodontogenic pain. A referral to a clinician with advanced training in the diagnosis of nonodontogenic pain should be considered if a nonodontogenic source is suspected.

Pain Does Not Cross Midline

Consider Referral to an Oral Maxillofacial Surgeon  
or Orofacial Pain Specialist

RADIOGRAPHIC IMAGING OPTIONS SYSTEMS



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# EXTRAORAL SWELLING

Patients who present with swelling that results in visible facial asymmetry (**fig. 5**) require immediate management of their acute condition. The rapid onset of signs and symptoms qualify these patients as true dental emergencies (9). In such cases, the clinician must have an efficient and effective protocol to manage these unscheduled and urgent scenarios. The **Extraoral Swelling System** is intended to function independently of all other systems and is used to identify and diagnose a treatable odontogenic source.

It can be challenging to capture quality diagnostic radiographs under these conditions. *Trismus* – the limited ability or inability to open the mouth – is a common condition associated with acute oral infections (10). Physical, anatomical, or behavioral limitations may also prevent capturing an intraoral image. A cone-beam computed tomography (CBCT) scan is highly encouraged, although a panoramic radiograph can be a reasonable alternative. All radiographic findings should be confirmed with an intraoral examination, if possible.

In the absence of radiographic imaging, an intraoral examination should be considered as a way to identify an etiologic source. The same limitations that can prevent intraoral imaging may hinder an intraoral examination. Although an odontogenic source may be clinically visible, any treatment recommendation should be delayed until proper radiographic imaging is acquired.

## Treatment Options

The treatment options for patients who present with acute extraoral swelling of odontogenic origin are limited to the following:

- Extraction of the source tooth (if radiographically and clinically confirmed)
- Endodontic treatment of the source tooth (if radiographically and clinically confirmed)
- Incision and draining
- Endodontic treatment (or extraction), and an incision and drainage
- Pharmaceutical management of signs and symptoms

Of the choices listed above, extraction offers the most definitive solution for addressing any primary etiology of odontogenic origin, with endodontic treatment being a close second. However, the presence of tissue inflammation decreases the efficacy of local anesthetic via inflammatory acidosis (11), leading to a potentially uncomfortable and painful treatment process. The same anesthesia challenges exist when considering the option of incision and drainage. Pharmaceutical management of signs and symptoms offers a conservative treatment option that is not definitive; once the patient's signs and symptoms become manageable, definitive treatment can be rendered.

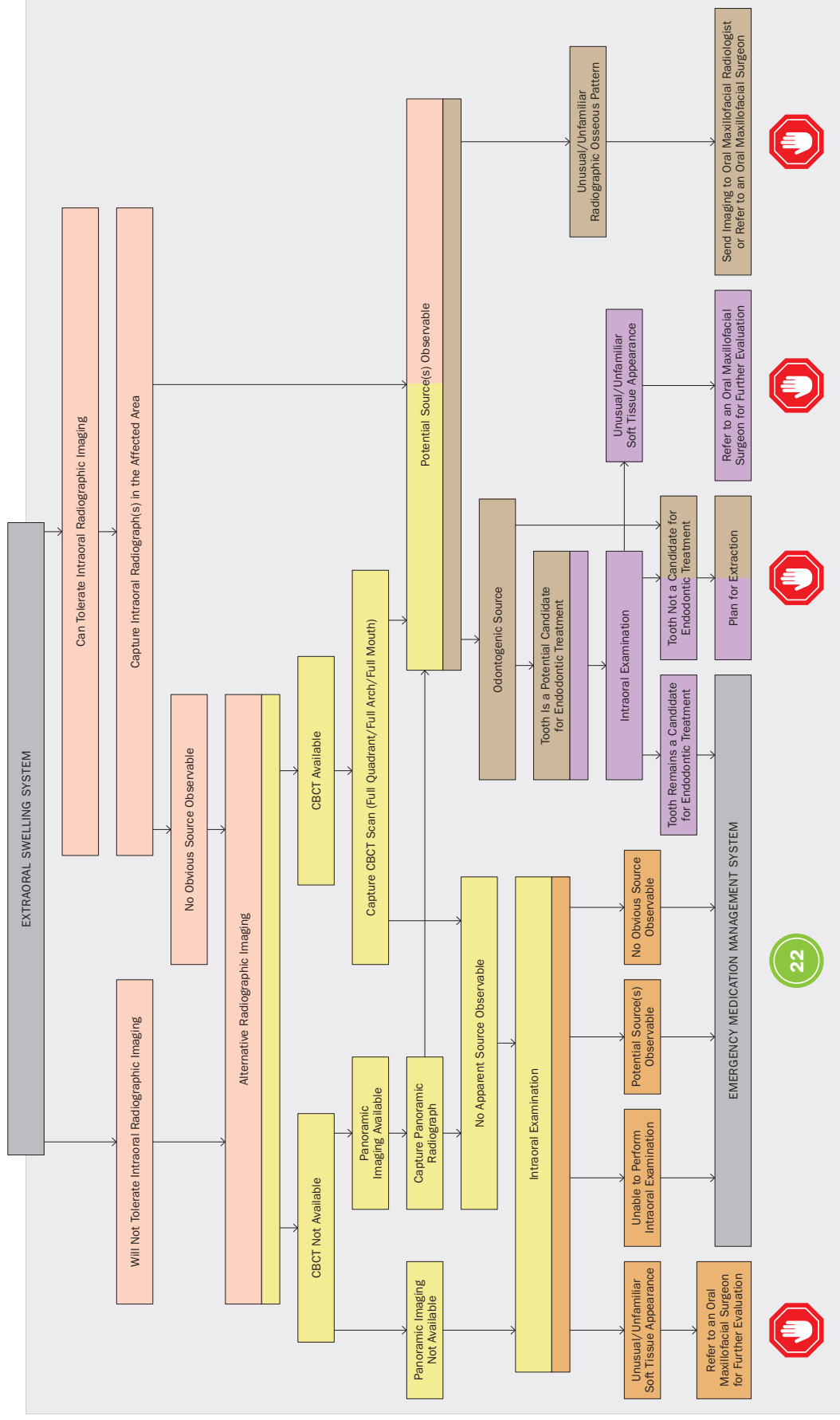




**Figure 5.** Swelling of the left maxillary buccal space resulting in facial asymmetry. Note the downward angulation of the left lateral commissure and slight closure of the left eye.

# Extraoral Swelling System

## OVERVIEW



ENDODONTIC EVALUATION SYSTEM

Active Chief Complaint

## EXTRAORAL SWELLING SYSTEM

A patient presenting with a symptomatic, acute extraoral swelling – *facial cellulitis* – may or may not tolerate traditional radiographic imaging based on the severity of symptoms.

## Will Not Tolerate Intraoral Radiographic Imaging

Extraoral radiographic imaging options should be considered.

## Can Tolerate Intraoral Radiographic Imaging

If the patient can tolerate intraoral radiography, the clinician should attempt to capture periapical imaging within the affected quadrant. Several radiographs may be required depending on the desired diagnostic range.

## Capture Intraoral Radiograph(s) in the Affected Area

Following radiographic acquisition, a potential etiologic source may or may not be radiographically observable.

## No Obvious Source Observable

If the periapical imaging does not reveal any reasonable etiologic source(s), an alternative extraoral radiographic imaging option should be considered.

## Alternative Radiographic Imaging

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## Potential Source(s) Observable

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**Ludwig's Angina**

Ludwig's angina represents a severe diffuse form of cellulitis affecting the submandibular, sublingual, and submental spaces bilaterally (**figs. 6 and 7**). It presents as an acute onset and spreads rapidly. It is considered a medical emergency and requires immediate medical attention. Patients suspected to have Ludwig's angina should be referred to a medical intensive care unit immediately (12).





**Figure 6. Ludwig's Angina.** Diffuse bilateral cellulitis of the submandibular, sublingual, and submental spaces. Note the anterior displacement of the tongue. (Images courtesy of Dr. Mike Cadogan, emergency physician, Sir Charles Gairdner Hospital, Perth, Australia.)



**Figure 7. Ludwig's Angina.** Diffuse bilateral cellulitis of the submandibular, sublingual, and submental spaces. (Images courtesy of Dr. Md. Hafizur Rahaman, chief consultant at New Super Dental Care, Bangladesh.)

Will Not Tolerate Periapical  
Radiographic Imaging

or

Capture Periapical Radiograph(s)  
in the Affected Area

No Obvious Source Observable

## Alternative Radiographic Imaging

The extraoral radiographic imaging option of choice for endodontics is cone-beam computed tomography (CBCT).

## CBCT Not Available

CBCT imaging may or may not be available to the clinician at the time of the examination, or may not be part of the clinician's philosophical imaging protocol. As an alternative, a panoramic radiograph should be captured.

## CBCT Available

An expanded field of view CBCT scan should be captured on the affected side.

Panoramic Imaging  
Not Available

If a panoramic image cannot be obtained due to a lack of availability, an intraoral examination should be considered.

Panoramic Imaging  
AvailableCapture Panoramic  
Radiograph

A potential source may or may not be observable.

No Apparent Source  
Observable

If the extraoral imaging does not reveal any apparent etiologic source(s), an intraoral examination should be considered

Capture CBCT Scan  
(Full Quadrant/Full Arch/Full Mouth)

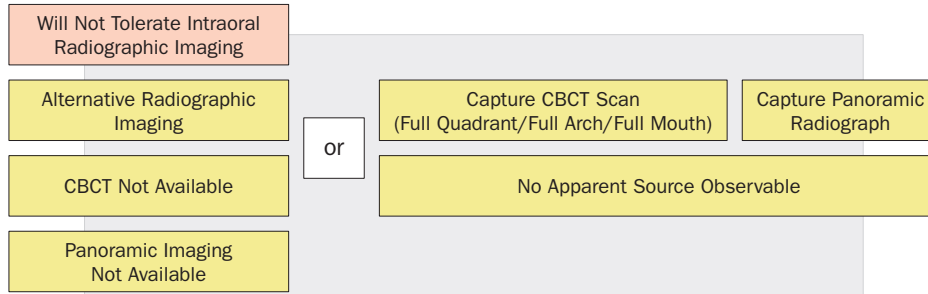
If an expanded field of view option is not available, multiple limited field of view scans may be required – depending on the desired diagnostic range. A potential source may or may not be observable.

Intraoral Examination

Potential Source(s) Observable

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18

How  
did I get here?

## Intraoral Examination

If the captured radiographic imaging does not reveal any potential etiologic source(s), or the patient could not tolerate traditional radiographic imaging – and no alternative imaging options are available – the clinician must consider performing an intraoral examination. This will provide further information as to the size and extent of the swelling; in some cases, it may reveal a potential etiologic source.

## Unusual/Unfamiliar Soft Tissue Appearance

If there is an unusual or unfamiliar appearance of the soft tissue, a referral to a clinician with advanced training in the diagnosis of oral pathology should be considered.

Refer to an Oral Maxillofacial Surgeon for Further Evaluation



## Unable to Perform Intraoral Examination

The patient's current condition may prevent an intraoral exam from being properly performed (most likely as a result of intolerance, trismus, or anxiety). In this case, a definitive source will be impossible to determine. The clinician should attempt to manage signs and symptoms.

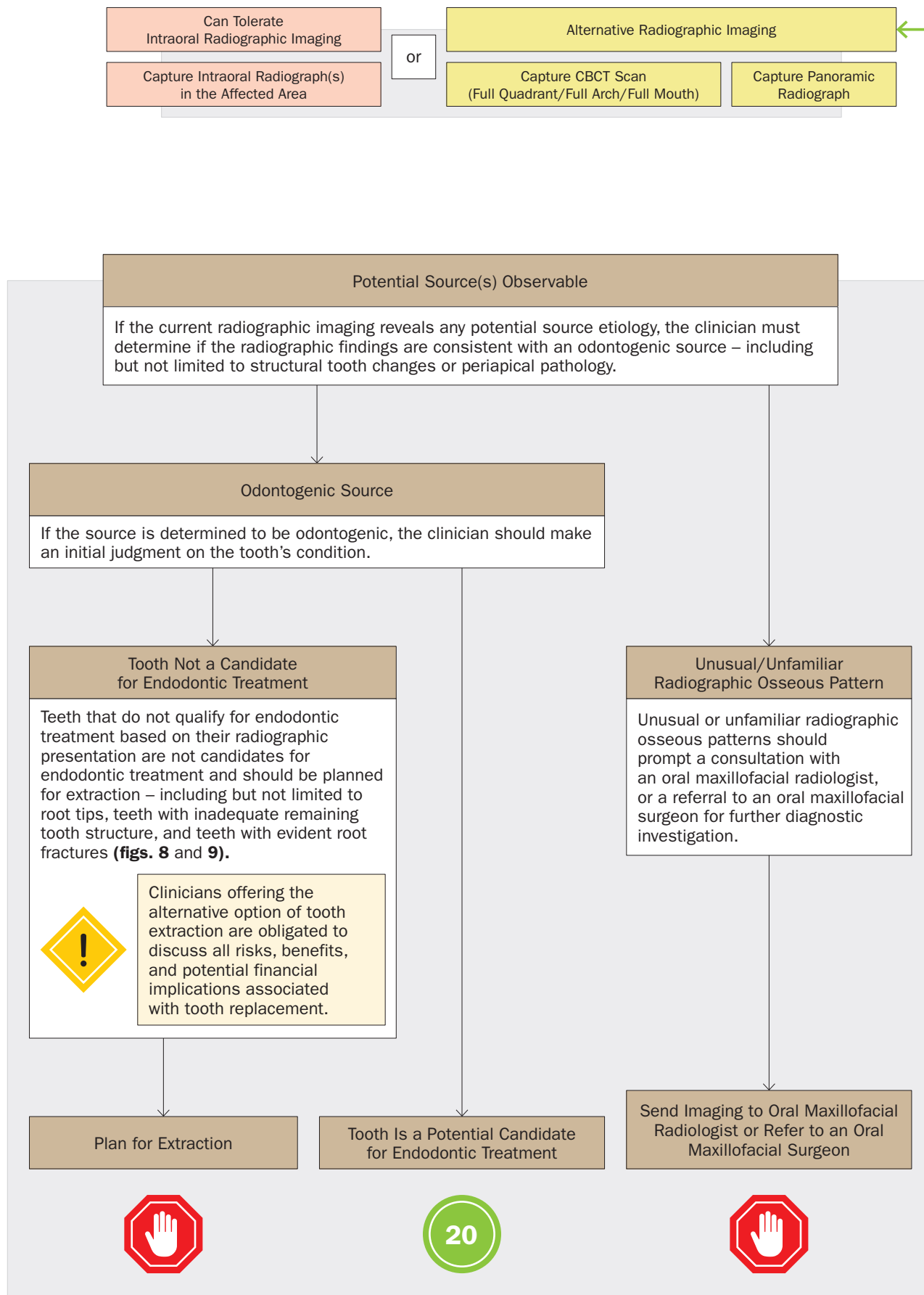
## Potential Source(s) Observable

If a potential odontogenic source can be identified, the definitive nature as to its involvement with the current condition is impossible to conclude in the absence of radiographic confirmation. Make note of the clinical findings and consider pharmaceutical management of signs and symptoms.

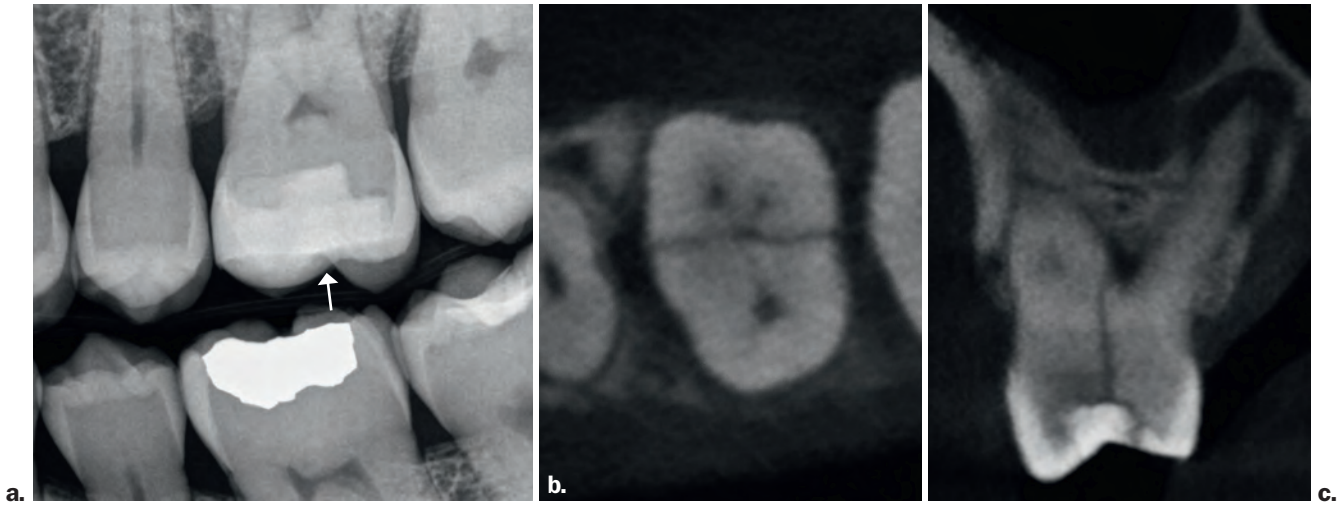
## No Obvious Source Observable

If the intraoral examination reveals no additional information, consider pharmaceutical management of signs and symptoms until proper imaging can be captured.

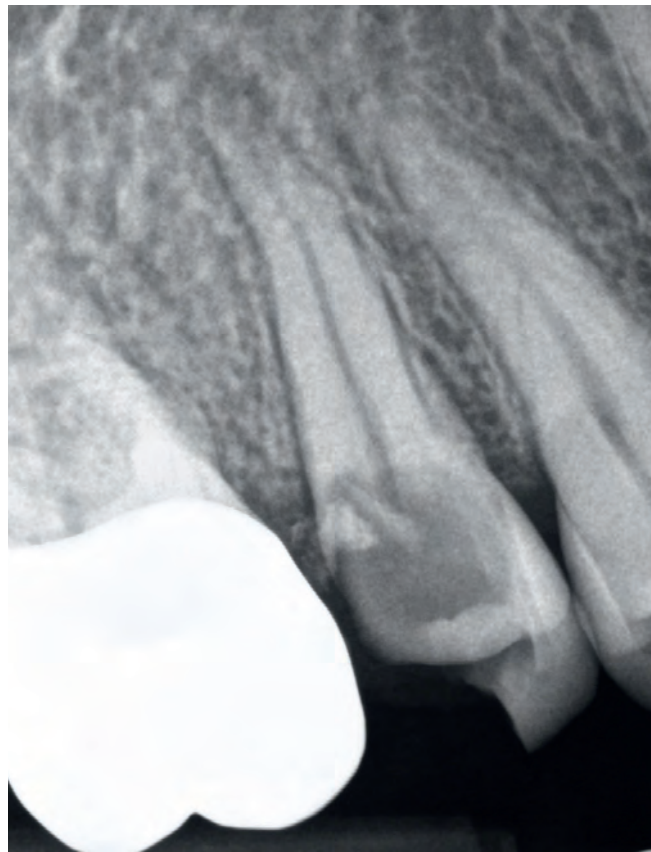
EMERGENCY MEDICATION MANAGEMENT SYSTEM







**Figure 8. Tooth Not a Candidate for Endodontic Treatment.** Bitewing radiograph demonstrating the maxillary left first molar with a moderately sized restoration and sound crestal bone support (arrow) **(a)**. Axial CBCT slice **(b)** and coronal CBCT slice **(c)** of the same maxillary first molar demonstrating a complete fracture through to the furcation. Note the areas of low density associated with the furcation as well and the palatal root.



**Figure 9. Tooth Not a Candidate for Endodontic Treatment.** Periapical radiograph of the right second premolar demonstrating gross caries on the distal, extending apical to the alveolar crest, in violation of the biologic width. Note the periapical radiolucency.

Potential Source(s) Observable

Odontogenic Source

## Tooth Is a Potential Candidate for Endodontic Treatment

A source tooth radiographically deemed treatable requires clinical confirmation. An intraoral examination may reinforce the radiographic findings or present new information that may alter the clinician's opinion.

## Intraoral Examination

## Tooth Remains a Candidate for Endodontic Treatment

If the source tooth remains a candidate for endodontic treatment (**figs. 10 and 11**) and the patient wishes to attempt to retain the tooth, the clinician must consider all reasonable treatment options – based on the severity of the current extraoral swelling condition.

EMERGENCY MEDICATION  
MANAGEMENT SYSTEM

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## Tooth Not a Candidate for Endodontic Treatment

If following an intraoral examination, the source tooth is no longer a candidate for endodontic treatment, the clinician should plan for extraction.



Clinicians offering the alternative option of tooth extraction are obligated to discuss all risks, benefits, and potential financial implications associated with tooth replacement.

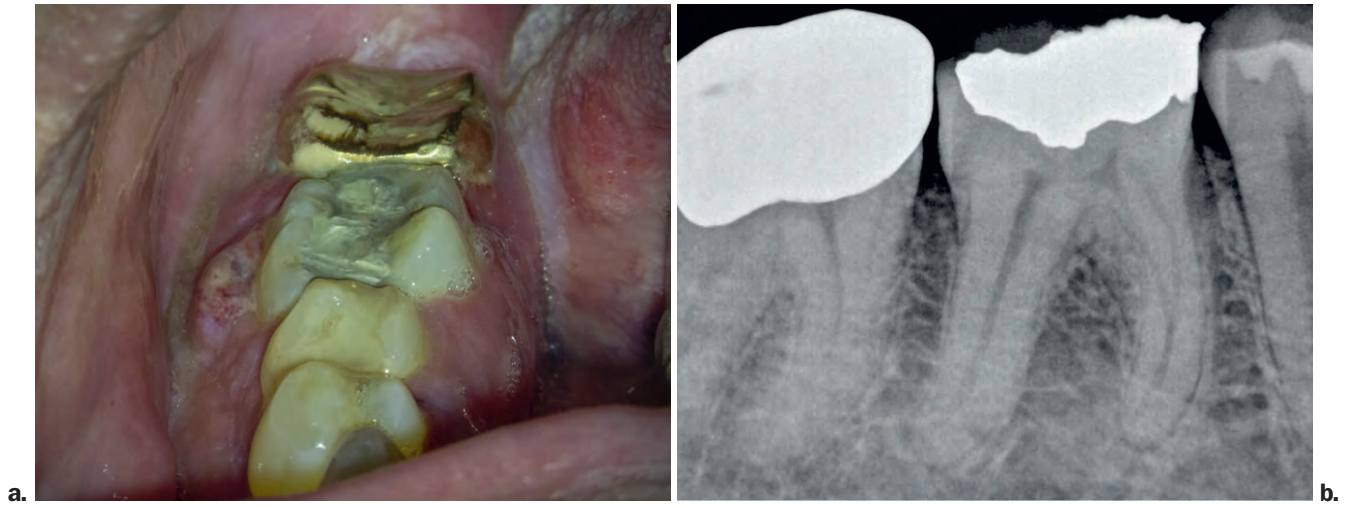
Plan for Extraction



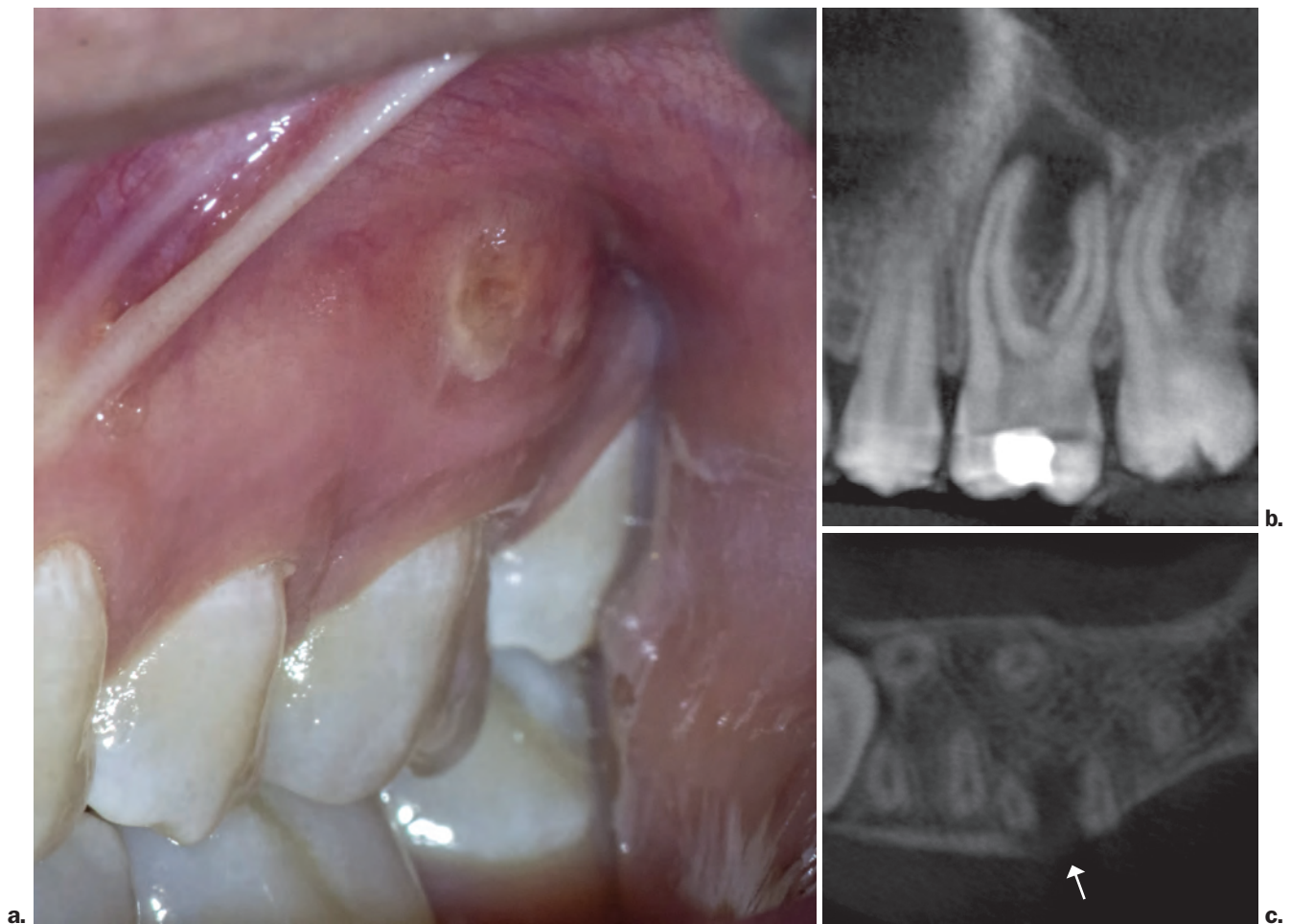
## Unusual/Unfamiliar Soft Tissue Appearance

If the intraoral examination reveals an unusual or unfamiliar soft tissue presentation, a referral to a clinician with advanced training in the diagnosis of oral pathology should be considered.

Refer to an Oral Maxillofacial  
Surgeon for Further Evaluation



**Figure 10.** Acute swelling associated with the mandibular right first molar **(a)** and associated periapical radiograph of the same region **(b)**. Note the absence of apparent radiographic pathology.



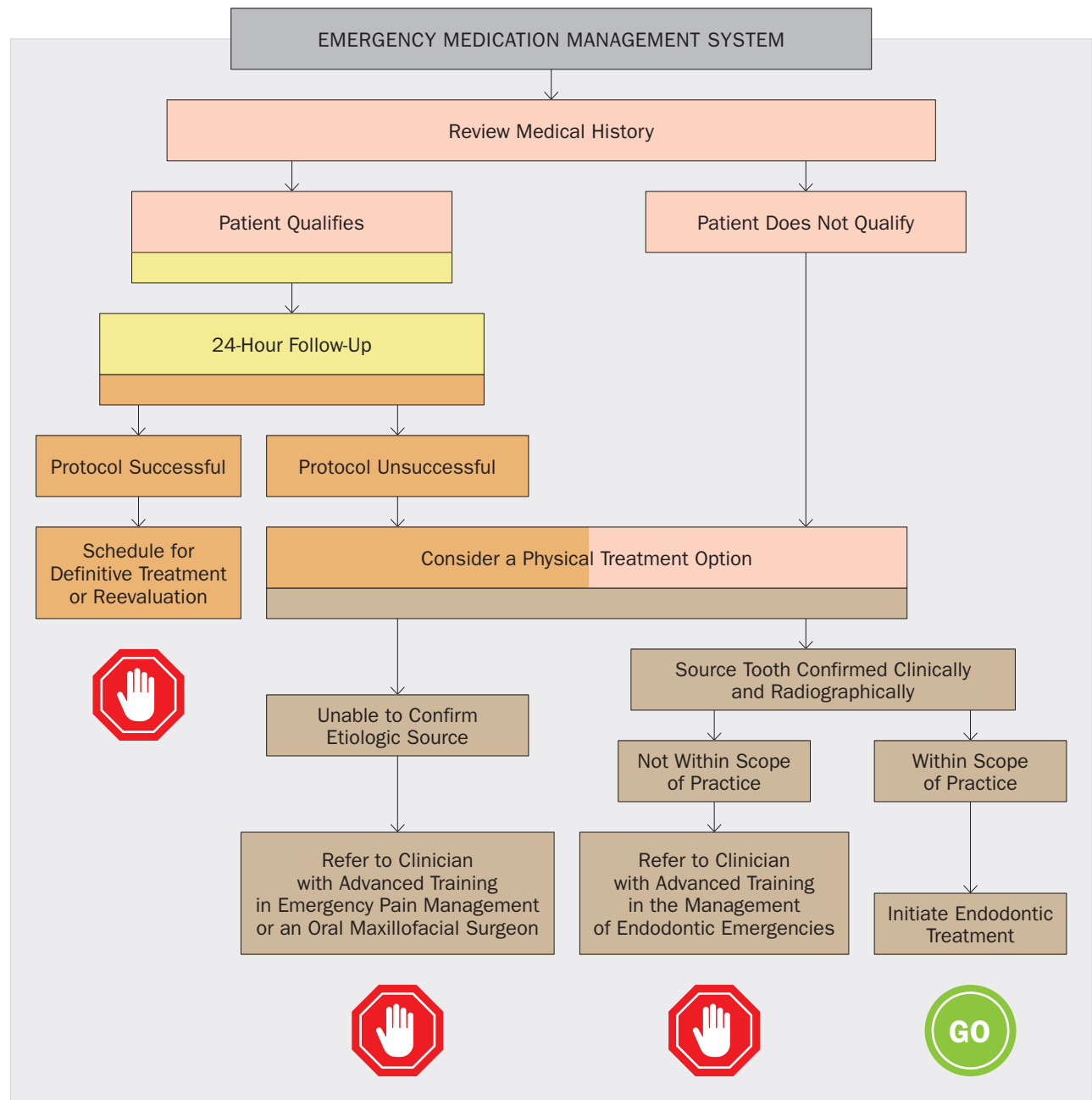
**Figure 11.** Acute swelling associated with the maxillary left first molar **(a)**. Sagittal CBCT slice **(b)** and axial CBCT slice **(c)** demonstrating an area of low density and discontinuity of the buccal cortical plate (arrow).

# Emergency Medication Management System

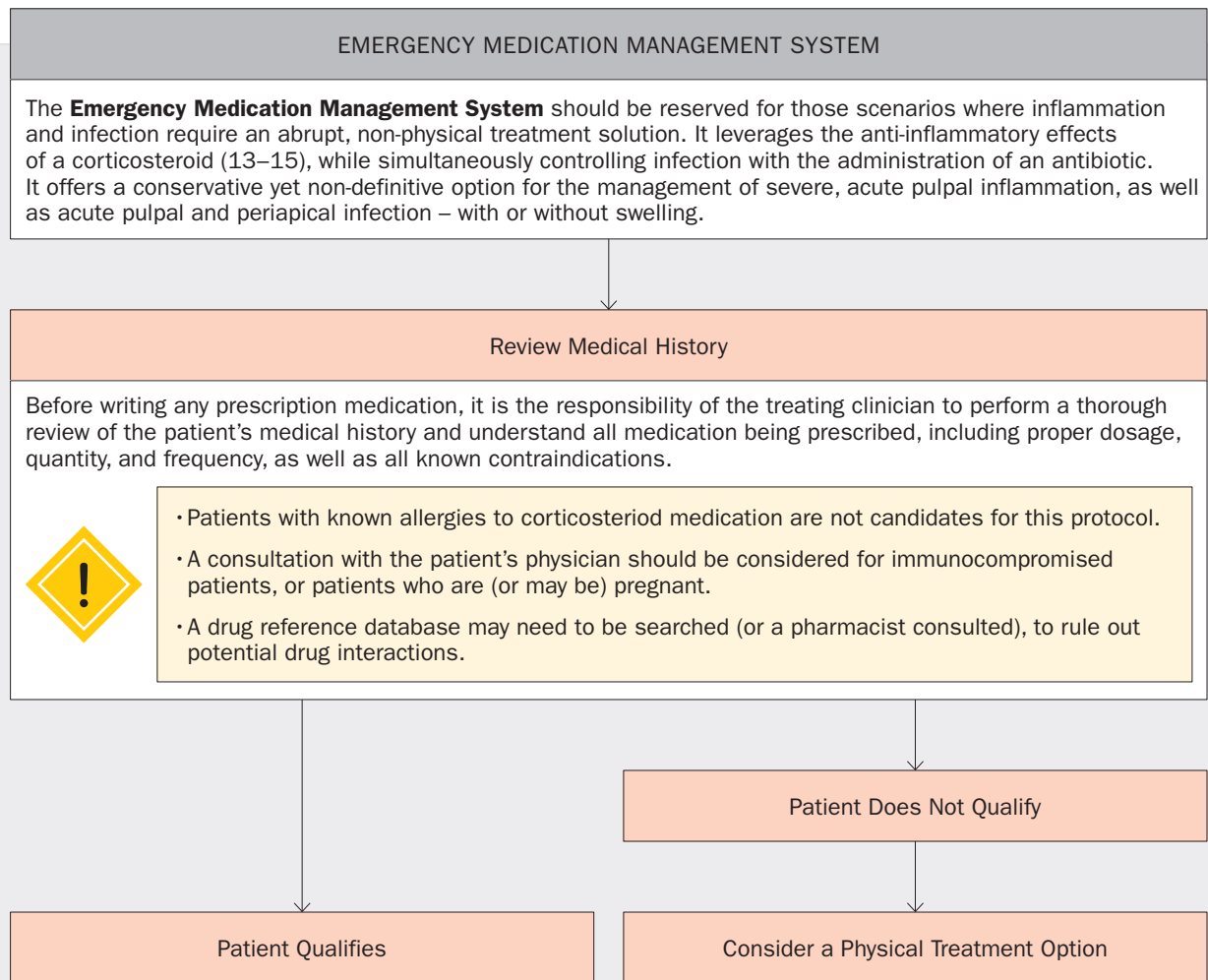
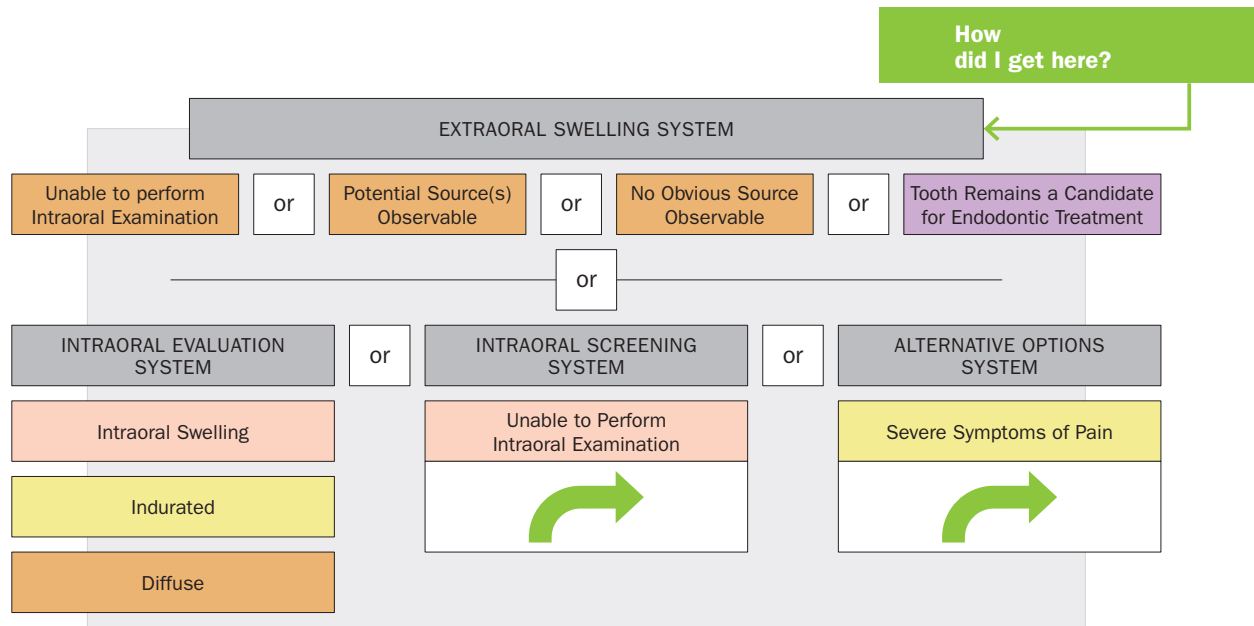
## OVERVIEW



Reserved for those scenarios where inflammation and infection require an abrupt, non-physical treatment solution.







Review Medical History

## Patient Qualifies

For qualifying patients, the following pharmaceutical protocol is suggested:

Methylprednisolone (Medrol) 4 mg, administered in the form of a **Medrol Dospak (fig. 12)** – written:

**RX:** Medrol Dospak

**SIG:** Take all 6 (six) tabs associated with day 1 STAT, follow package direction for days 2–6

**DISP:** 1 (one) with no refills

and

For patients with **no penicillin allergy**,  
Amoxicillin 500 mg should be considered  
and written as follows (16):

**RX:** Amoxicillin 500 mg

**SIG:** Take 1 (one) tab TID until gone

**DISP:** 21 (twenty-one) with no refills

For patients with a **penicillin allergy**,  
Azithromycin 250 mg or Clindamycin 300 mg  
should be considered and written as follows (16):

**RX:** Z-Pak

**SIG:** Follow package instructions

**DISP:** 1 (one) with no refills

or

**RX:** Clindamycin 300 mg

**SIG:** Take 1 (one) tab TID until gone

**DISP:** 21 (twenty-one) with no refills

24-Hour Follow-Up

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i

Medrol is a steroidal anti-inflammatory medication and therefore, an immunosuppressant (13). In order to prevent infection – or to manage an existing infection – a prescription for an antibiotic should also be written.

Medrol is contraindicated in patients with known hypersensitivity to any components of the product and in patients with systemic fungal infections (17).

Clindamycin carries a black box warning for the risk of pseudomembranous colitis from *C. difficile* associated diarrhea (CDAD), which can be fatal. CDAD can occur during treatment with clindamycin but has also been reported over two months after its use (18).

- The antibiotic type may be substituted in the event of a known allergy.
- If multiple antibiotic allergies exist, and the treating clinician is uncertain about a safe antibiotic type, a consultation with a pharmacist should be considered.
- Generic substitutes can be used whenever possible.



**Figure 12.** Blister pack of 4 mg tablets of methylprednisolone. Note the instructions written directly on the packaging. The patient should be informed to follow the prescriber's instructions for the first day in place of the package instructions.

Patient Qualifies

(Medication administered)

## 24-Hour Follow-Up

## Protocol Successful

If the protocol is successful, there should be a significant reduction in the patient's pain level within 12 to 24 hours, following the administration of the "day 1" Medrol loading dose. Swelling should begin to subside, but at the very least, it should not increase in size. A follow-up call should be placed within 24 hours to confirm these findings. Signs and symptoms may not be completely resolved, but they should be considerably more manageable – no longer perceived as an emergency or urgent situation. If successfully managed, the patient should be advised to continue administering the medications as prescribed. A reevaluation or a definitive treatment option should be rendered within 5 to 7 days.

## Protocol Unsuccessful

Although predictably successful in the majority of odontogenic emergency scenarios, this protocol may only provide minimal relief for some and no relief for others. If this protocol does not provide the anticipated result within a 24-hour time frame, a physical means of emergency treatment should be considered.

## Schedule for Definitive Treatment or Reevaluation

Upon the patient's return to the clinic, either endodontic treatment should be initiated or the diagnostic process continued.



If a source tooth has been diagnosed and all preoperative radiographic imaging has been acquired, move forward with endodontic treatment.

GO



If all radiographic imaging has been captured, yet a source has not been confirmed, refer to the **Diagnostic Protocol Options System** and begin the diagnostic process.

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If further radiographic imaging is required, refer to the **Standard Radiographic Acquisition System** and capture all remaining images before initiating treatment.

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If the source has not yet been confirmed and further radiographic imaging is required, refer to the **Standard Radiographic Acquisition System** and capture all remaining images.

46



If radiographic imaging could not be captured at the initial visit, refer to the **Radiographic Imaging Options System** and begin the diagnostic process.

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Consider a Physical  
Treatment Option

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How  
did I get here?

Patient Does Not Qualify

or

Protocol Unsuccessful

## Consider a Physical Treatment Option

If the patient does not qualify for the **Emergency Medication Management System**, or if the protocol has proven unsuccessful, a physical emergency treatment option should be considered. Preoperative radiographic imaging and a definitive preoperative diagnosis are required before initiating any treatment.

## Unable to Confirm Etiologic Source

If the etiology has not yet been determined, no definitive treatment can be rendered. A referral to a clinician with advanced training in emergency pain management should be considered. If the reader is a clinician with advanced training in emergency pain management, a second opinion from a colleague or a referral to an oral maxillofacial surgeon should be considered.

Refer to Clinician with Advanced Training in Emergency Pain Management or an Oral Maxillofacial Surgeon



## Source Tooth Confirmed Clinically and Radiographically

Due to the challenges of managing emergency pain and swelling of pulpal origin, the treating clinician must use sound judgment regarding the given emergency scenario (including the patient's predisposition) and determine if treatment falls within their scope of practice.

Not Within Scope  
of Practice

A referral to a clinician with advanced training in the management of endodontic emergencies should be considered.

Refer to Clinician with Advanced Training in the Management of Endodontic Emergencies



## Within Scope of Practice

When a definitive diagnosis has been achieved and the treatment is deemed to fall within the clinician's current scope of practice, move forward and initiate the treatment process.

Initiate Endodontic Treatment

