Effects on the Gastrointestinal System: Stomatitis and Mucositis

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Mucositis or stomatitis (A – 1) is inflammation of the mucosa of the oral cavity and, in some cases, the esophagus. In patients with leukemia, mucositis can extend throughout the gastrointestinal system. This condition is commonly induced by cancer chemotherapy, radiation therapy or neutropenia. As many as 40% of all patients develop some degree of oral epithelial denuding during chemotherapy. Ninety percent of children and adolescents undergoing cancer treatments will experience mucositis.

Chemotherapy and radiation therapy can interrupt the growth of healthy cells in the gastrointestinal system. Because chemotherapy and radiation therapy kill cells nonselectively, the rapidly growing cells of the gastrointestinal system, particularly those of the mouth, are destroyed before they mature. When the mouth tissues are weakened or destroyed, mouth sores are likely to develop and take longer to heal than those in a normal mouth.

Although the development of mucositis was initially thought to be a one-step process that was a direct consequence of epithelial injury by radiation therapy or chemotherapy, recent studies suggest otherwise. The pathogenesis of mucositis (A – 2) appears to involve all cell types of the oral mucosa (epidermis and submucosa) and results from a series of biological events that involve different cells and tissues of the oral, oropharyngeal and gastrointestinal mucosa. Genetics may play a role in the development of mucositis.

Assessment

The appearance of stomatitis can range from reddened areas to deep ulcerations. Tissues in the mouth and under the tongue may be swollen and shiny. Other signs and symptoms (A – 3) include pain; difficulty in swallowing; a raw feeling in the throat; thick oral secretions; red, inflamed patches that may have white spots; cracked lips; blood in the mouth and drooling. The severity of mucositis can be determined by using one of several oral assessment tools (A – 4). Patients at risk are those who have received bone marrow transplants, received high-dose chemotherapy or have had radiation therapy in the head and neck area. Nursing assessments

should also evaluate the impact of mucositis on the patient's nutrition, comfort level and overall quality of life.

Planning

Ensuring that the patient has good oral health before treatment helps to decrease the chance of infection and other complications that may arise from mucositis. Each patient should undergo a full dental evaluation in part to identify potential sites of oral infection, such as grossly decayed teeth and periodontal disease.

The nurse should develop a plan of care that results in the following:

- The demonstration of good oral hygiene by the patient
- The identification of the appropriate oral medications by the patient and family
- The development of the patient's and family's ability to identify situations that require immediate medical attention
- The maintenance of the optimal nutritional status of the patient

Implementation

Mucositis is managed through symptomatic, palliative and supportive measures. Palliative and symptomatic measures include the practice of good oral hygiene and the use of topical rinses and analgesics. Maintaining good oral hygiene during treatment by using antibacterial mouth rinses, by brushing or swabbing and by using oral antifungal medications will decrease the microbial load in the mouth and reduce the chance of secondary infection, systemic infection or both. Several studies have shown that good oral hygiene can decrease the intensity of mucositis.

The nurse should educate the patient about good oral-hygiene practices such as using a soft toothbrush to clean the teeth, flossing when the oral tissues are healthy and the platelet count is acceptable and applying medications to the oral cavity. Petroleum jelly can be applied to the patient's lips to retain moisture and prevent cracking.

Topical rinses can be simple solutions such as baking soda and saline, viscous lidocaine rinses (2%) and more complex ones such as a cocktail made of lidocaine, diphenhydramine (Benadryl), sorbitol and Mylanta. Acetaminophen (Tylenol) and, in some cases, an opioid may be administered to relieve pain. However, care should be taken when opioids are used because of their side effects such as drowsiness and constipation.

The presence of mucositis often influences food intake. To maintain an appropriate nutritional status, the child or adolescent may need a soft diet (A – 5) that consists of cool or bland foods. The patient should be encouraged to drink plenty of fluids (unless they are contraindicated) and to avoid hot, spicy foods. Popsicles, ice cream or ice chips can provide needed fluids and comfort (the low temperature is soothing to the inflamed area).

Patient and Family Education

To help to ease the discomfort and prevent the consequences of mucositis (pain, dehydration, weight loss, infection and fatigue), the nurse can teach the patient and the family several self-care measures (A – 6).

Evaluation

If the care plan is well executed, the patient and family should be able to effectively manage mucositis with minimal alterations in the overall quality of life, comfort level and nutrition. In addition, the patient will not develop subsequent infections (local or systemic) as a result of mucositis.

Helpful Web Links

National Institutes of Health/National Institutes of Dental and Craniofacial Research, Bethesda, MD
Etiology and Biology of Oral Mucositis
http://symptomresearch.nih.gov/Chapter_17/sec2/cghs2pg1.htm

Cancer Supportive Care Programs – National and International
Mucositis – Oral Problems and Solutions
http://www.cancersupportivecare.com/oral.php

The Oral Cancer Foundation, Newport Beach, CA
Best Practice – Evidenced-Based Practice Information
http://www.oralcancerfoundation.org/dental/pdf/mucositis.pdf

University of Virginia Health Systems, Charlottesville, VA
http://www.healthsystem.virginia.edu/uvahealth/peds_oncology/manmuc.cfm

Oncology Education Services
Advancing the assessment and treatment of oral mucositis
There are 4 seminars in this weblink – assessment through treatment of mucositis
http://oes.digiton.com/mucositis/overview.asp

Related www.Cure4Kids.org Seminars

Seminar #615 Mouth Care
Christopher Rowland, DDS
http://www.cure4kids.org/seminar/615

APPENDIX

A – 1 Mucositis

Patients who are receiving chemotherapy may develop symptoms of oral mucositis as early as 3 days after treatment. Mucositis typically take 5 to 8 days to progress from the initiation phase (phase 1) to the ulceration phase (phase 4) and lasts between 7 to 14 days.

Radiation-induced mucositis is dependent upon the cumulative amount of radiation received and is commonly associated with 15 to 20 Gy of fractionated radiotherapy. Erythema and edema usually appear within 2 weeks after the start of radiation therapy and is usually associated with higher doses (≥30 Gy). Healing and recovery may take days and depends upon the severity.

Courtesy of Christopher Rowland, DDS, St. Jude Children's Research Hospital

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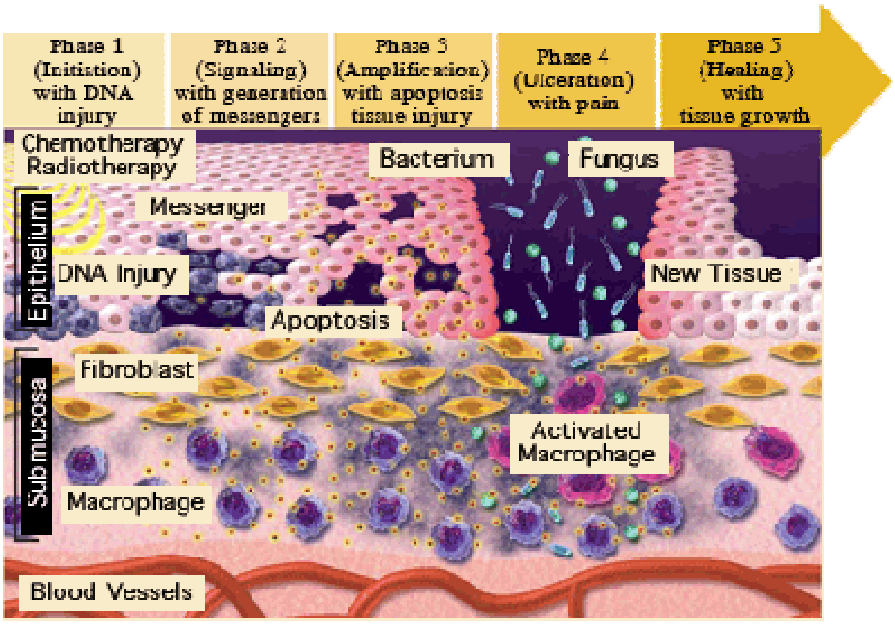
A – 2 Pathobiology of Mucositis



Adapted from Sonis. *Nat Rev Cancer.* 2004;4:277-284.
Kepivance
www.kepivance.com/ oral_mucositis/etiology.jsp

Phase 1 (Initiation) – Radiation therapy or chemotherapy directly injures the basal epithelial cells and cells of the underlying tissues and introduces breaks in DNA strands, disrupting normal cellular function. The mucosa appears to be normal.

Phases 2 (Upregulation) and 3 (Signaling and Amplification) – Once transcription factors are activated, they stimulate the production of proinflammatory cytokines, leading to apoptosis of the submucosal and basal epithelial cells and destruction of the subepithelial and basement membrane. There are minimal clinical symptoms at this phase, although some mucosal erythema may occur.

Phase 4 (Ulceration) – This phase is most symptomatic. Degradation of the mucosa causes extremely painful lesions. Mucosal breaks provide an avenue in which opportunistic infections can occur, increasing the risks of bacteremia and sepsis and thus delaying cancer treatment.

Phase 5 (Healing) - Healing is initiated, and epithelial proliferation and differentiation is renewed. The mucosa appears to be normal, but the patient remains at risk of mucositis with subsequent cancer therapy.

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A – 3 Assessment – Signs and Symptoms

Halton Region Health Department
The Regional Municipality of Halton, Ontario, Canada
http://www.region.halton.on.ca/health/programs/dental/special_needs_oral_health_concerns/stomatitis_mucositis.htm

Jules Bordet Insitute, Brussels, Belgium
www.bordet.be/servmed/ laser/nl/dracht.htm

Pacific Prosthodontics, Seattle, Washington
http://www.pacificprosthodontics.com/services/oncology.html

Course of Mucositis (range)

1st day of treatment - There are no noticeable changes in the mouth, but injury has occurred.

3-5 days after treatment – Soft tissues in the mouth begin to feel warm.

7-10 days after treatment – The soft tissues show more injury; inflammation and sores appear.

During the treatment period – Sores become painful and, in some cases, infected; eating and swallowing may be affected.

2-9 *weeks* after the completion of treatment – Sores heal and disappear.

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A – 4 Scales Used to Assess Oral Mucositis

Source	Grade 0	Grade 1	Grade2	Grade 3	Grade 4
World Health (WHO)	No changes	Soreness with erythema	Erythema, ulcers, can eat solids	Ulcers, liquid diet only	Alimentation not possible
WCCNR	No changes	Slight erythema, 1 to 4 ulcers, moist mucosa, no bleeding or infection, mild edema, avoids harsh, hot or spicy foods because of oral sensitivity and experiences mild discomfort or burning sensation	Moderate erythema, more than 4 lesions that are not coalescing, bleeding of mucosa with probing, mild xerostomia, moderate edema, evidence of mild infection, able to drink fluids and eat soft bland foods, moderate continual pain with use of intermittent analgesics	Severe erythema, more than 1 confluent ulcer, spontaneous bleeding, marked xerostomia, severe edema, infection, alimentation not possible, constant severe pain requiring systemic analgesics	Not Applicable
NCI CTC(For Bone Marrow Transplantation)	No changes	Painless ulcer or mild soreness without a lesion	Painful erythema, edema or ulcers, but can swallow	Painful erythema, edema or ulcers preventing swallowing or requiring hydrations or nutritional support	Severe ulcerations requiring prophylactic intubation or resulting in documented aspiration pneumonia
NCI CTC v.2 (For Radiation Therapy)	No changes	Erythema	Patchy pseudo-membranous reaction (patches generally ≤ 1.5 cm in diameter)	Confluent pseudomembranous reaction (≥1.5cm in diameter)	Necrosis or deep ulceration
NCI CTC (For Chemotherapy)	No changes	Painless ulcers, erythema or mild soreness in the absence of lesions	Painful erythema, edema or ulcers, but can eat or swallow	Painful erythema, edema or ulcers requiring IV hydration	Severe ulcerations or requires parenteral or enteral nutrional support or prophylactic intubation
OMAS Ulceration	Normal	<1 cm^2	Between 1 and 3 cm^2	>3 cm^2	Not Applicable
OMAS Erythema	Normal	Not severe	Severe	Not Applicable	Not Applicable

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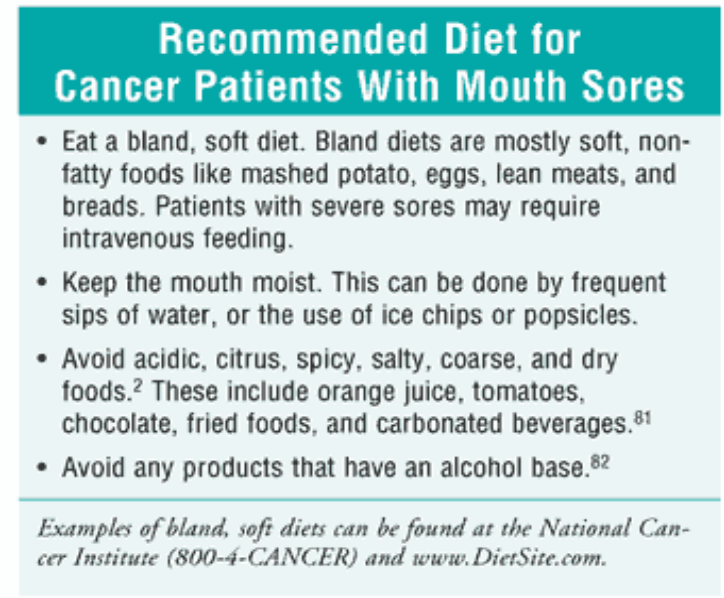
A – 5 Dietary Management of Mucositis



USPharmacist C.E.TM, Inc., Bloomfield, NJ
http://www.uspharmacist.com/Images/Articles/mucositisT3.gif

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A – 6 Self-Care Measures

- Report any symptoms to the health care provider as soon as possible.
- Take care of your mouth and keep it clean – use either a toothbrush with very soft bristles or an oral sponge. Rinsing the toothbrush in warm water can make the bristles even softer.
- If toothpaste is irritating, use a mixture of salt and water (1/2 tsp of salt with 4 cups of water) in place of toothpaste.
- Floss gently. It is OK to not floss areas that are tender.
- Gargle regularly. The solution to be gargled should consist of

  1 quart (1000 ml) plain water
  ½ tsp table salt
  ½ tsp baking soda
- Drink plenty of fluids.
- Soothe mouth sores by using ice chips, Popsicles or ice cream.
- Use an analgesic (Tylenol, ibuprofen) for mild pain and stronger drugs such as opiates for severe pain; use the liquid preparation of the analgesic if swallowing is a problem. Some over-the-counter anesthetics such as Oragel, lidocaine, Anbesol and Gelclair can also be used.

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