

XEROSTOMIA

Dry Mouth, the Internet and You

Case Report

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A 70-year-old man had metastatic colonic carcinoma, had really enjoyed life and didn't want to die. He was managed by his own local and oncologist doctors but I knew him socially. I was running around the park near my home and met his wife who was walking their two ageing German shepherds. She was in quite a state herself – virtually at wits end because her husband was not eating, barely drinking and was even having difficulty talking. His situation had been deteriorating over the past 6 weeks and it seemed this was all due to his dry mouth (Fig. 1).

I rattled off some supportive advice and we concurred that it was probably due to the morphine he was taking and that all that could be done had been done. I arrived home a little tired from my run but more annoyed at my own perceived lack of knowledge about the management options for a dry mouth. I was much more familiar with using atropine to treat the excess of secretions that often occurs in the terminally ill, and reasoned that if pharmacological intervention could dry up oral secretions, then the reverse must be possible.

An internet search on my home computer for 'morphine dry mouth' instantly yielded over 1 million digital references as web pages. The first article I opened, titled 'OncoTip: Dealing With a Dry Mouth (Xerostomia)', described head and neck radiotherapy as the most common cause of xerostomia and listed management options, including a tablet containing pilo-

carpine.^[1] Within 15 minutes of beginning my search, I had the article downloaded and faxed it off. I got an unexpectedly excited response; unbeknown to me, he had had radiotherapy treatment some 6 weeks previously to halt the spread of the cancer and had suffered a dry mouth ever since.

Pilocarpine is not available as a tablet in Australia but is available as eye drops used in the management of chronic primary open angle glaucoma, acute primary closed angle glaucoma and for the reversal of weak mydriatics.^[2] After a further internet search to find out more about the dosage range when treating xerostomia, that same afternoon I started him on 2.5 mg pilocarpine in solution – with immediate effect.^[3] At first he objected to the taste, so I had some myself and it was tolerable. A dose of 5 mg was more effective but it was followed by profuse sweating, which he found distressing, and limited its use.

This man knew he had a terminal condition and when he could no longer tolerate the chemotherapy, accepted radiotherapy only to find he was left with a problem he felt was even worse. Remarkably, throughout this period he never lost hope of recovery, even when he appeared to be abandoned by medical science for a solution to both his cancer and his dry mouth. This man, Mr Ken Chapman, did succumb to his cancer and this article was written not only with his agreement and that of his wife, but with their enthusiastic support so that other people in Australia might not suffer to the same degree from the debilitation and discomfort of a dry mouth.



Figure 1.

Xerostomia: What is it?

Salivary glands have both serous and mucinous secretions, are produced in structurally discrete parts of the glands and in differing amounts by the different glands. The main glands are the parotid, the submaxillary and the sublingual. The Russian physiologist,

Xerostomia results from reduced secretion of saliva and leads to difficulties with eating, speaking, dental decay and oral infections

Ivan Pavlov, described salivation in his dogs as a conditioned reflex, so understandably the innervation and regulation of salivary gland function is complex. Their innervation is nociceptive, sympathetic and parasympathetic, however, secretomotor regulation is largely cholinergic.^[4]

Xerostomia results from reduced secretion of saliva, particularly the serous component, and leads to difficulties with eating, speaking, wearing dentures, changes in taste, gland enlargement and oral infections. In addition, deterioration of the dentition is accelerated because of the now acidic environment, the loss of the remineralising microenvironment and absence of protective immunoproteins.^[5]

Why it Happens

Xerostomia is most often iatrogenic but is a feature of a number of diseases. Drugs with anticholinergic activity can cause dry mouth.^[6] The clinical management of these conditions is often not a major issue because the effect wears off as the nerves reset themselves, patients tolerate this mild discomfort for their greater good or the offending medication is ceased. Nevertheless, it is most important to be aware that in the elderly, dry mouth is not a consequence of their ageing physiology but more likely a consequence of their medication.^[5] Xerostomia resulting from drug interference with the neural input is often less severe than when the glands themselves are affected.

This case report typifies the more extreme end of the problem — where the serous acinar cells were damaged by the radiation aimed at the tumour cells. This is the most common cause of severe xerostomia. Radiation damage occurs in over 75% of patients who have received head and neck

radiotherapy. However, the extent is clearly dependent upon the dose of radiation and individual susceptibility.^[7] The main causes of xerostomia and the probable mechanism for each are listed in Table 1.^[5-8]

What can be done?

The first priorities are to avoid agents that dry the mouth and to maintain general oral hygiene. Salivary replace-

ment agents should then be considered and finally, contemplate pharmacological intervention with pilocarpine.^[1,5] These management options are listed in Table 2.

Oral replacement solutions containing carboxymethylcellulose are available in Australia, the reputedly more effective ones containing gastric mucin having been discontinued.

Pilocarpine is a cholinergic agent that augments acetylcholine released from the nerve endplates and so drives what may remain of the glands to produce more saliva. In addition, pilocarpine administered concomitantly with radiotherapy is believed to have some protective benefit on salivary glands.^[7] Marketed as Salagen (5 mg tablet), it is the only agent registered with the US Food and Drug Administration (FDA) for use in both radiation-induced xerostomia and Sjögren's syndrome. The most common side-effect is sweating, as with this case, but may also include urinary frequency, chills, flushing,

Table 1. Main causes of xerostomia

Cause	Mechanism
Medications	Anticholinergic – often antihypertensives, antidepressants
Radiotherapy	Degenerative and inflammatory effects
Sjögren's syndrome	Autoimmune antibodies to secretory cells
Graft vs host disease	Immune reactions against bone marrow transplantation
HIV	Parotid gland enlargement following CMV infection

CMV = cytomegalovirus

Table 2. Xerostomia management options

- Avoid oral drying agents: drinks or food with high sugar content, mouth rinses containing alcohol
- Rinse with a salt/baking soda solution up to 6 times daily*
- Clean teeth after each meal and before bedtime; use a fluoride-containing toothpaste
- Apply a prescription strength fluoride gel at bedtime
- Use a moisturising stick on the lips regularly
- Have a water bottle to keep the mouth moist at all times. Alternatively use an oral saliva replacement solution
- Use pilocarpine to stimulate saliva

* Half a teaspoon of both salt and baking soda in a cup (250 mL) of water.

Table 3.

Preparation of a pilocarpine solution for treatment of xerostomia

In a standard insulin syringe take 12.5 U (0.125 mL) of 4% pilocarpine solution, dilute to 100 U (1 mL) with saline.

50 U (0.5 mL) = 2.5 mg; 100 U (1 mL) = 5.0 mg (usual dose)

Use three times daily

occasional dizziness, excessive tearing, changed voice, nasal stuffiness, tremor, visual disturbances, abdominal pain, nausea, diarrhoea and a slowed heart rate.^[3]

Pilocarpine is contraindicated in patients with uncontrolled asthma or emphysema, acute iritis or acute primary closed angle glaucoma. It should be used with caution in patients with airway, cardiac, biliary or psychiatric diseases, pregnant or lactating women and children.^[9]

Severe xerostomia is a frequent consequence of radiotherapy to the head and neck

Pilocarpine is not registered for treatment of xerostomia (ie tablet form) in Australia, nor is xerostomia a recognised indication for pilocarpine in the first edition of the *Australian Medicines Handbook*. Unless this situation in Australia changes, the use of pilocarpine to relieve xerostomia will require using the already available eye drop formulations, as in this case and detailed in Table 3.

The Internet and You

The other feature of this case was the use of the internet to rapidly research an unknown topic — and you can do it too! More and more patients are coming to the surgery wanting clarification of something downloaded from the internet and this will only increase. The typical response from the internet is masses of unfiltered information, but with our medical training we become the ideal sieve. The article I selected, 'OncoTip: Dealing With a Dry Mouth (Xerostomia)'^[1] was written by Dr James Metz, MD in January 1998, who according to that

article was affiliated with the University of Pennsylvania Cancer Center, so it appeared to be reasonably current and to have a reputable basis.

Rather than going back to those 1 million plus articles to see if I could find some further recommendations regarding suitable dosages, possible side-effects, contraindications and potential interactions of oral pilocarpine, a search on 'xerostomia' proved more efficient. Again it was all too easy. I found a summary of a 1993 article which

indicated that the effective therapeutic threshold was 2.5 mg pilocarpine taken three times daily.^[3] In that study, the highest dose was 10 mg three times daily, with a maximal response some 10–12 weeks into treatment.

In terms of accessibility and currency of the information the internet cannot be surpassed, although it must be viewed critically. Anybody can repeat the searches but for those who may want to review some relevant sites directly, some useful internet addresses are listed in the References section.

Conclusion

The purpose of this article was not to provide a comprehensive review of xerostomia. Rather, I wanted to raise the awareness of the possible management options of this perhaps not so unusual presentation in the Australian context. I hope this case also exemplifies the way the internet can currently be used as a tool to provide a window into world best practice for a particular condition or problem. **CT**

References

1. Metz J. OncoTip: Dealing With a Dry Mouth (Xerostomia). University of Pennsylvania Cancer Center, 1998. Available from <http://www.oncolink.upenn.edu/support/tips/tip5.html> (updated August 1999)
2. Misan G, editor. Australian Medicines Handbook. 1st ed. Australian Medicines Handbook Pty Ltd, 1998: 11-20
3. LeVeque FG, Montgomery M, Potter D et al. A multicenter, randomized, double-blind, placebo-controlled, dose-titration study of oral pilocarpine for treatment of radiation-induced xerostomia in head and neck cancer patients. *J Clin Oncology* 1993; 11: 1124-31. Available from http://www.oncolink.upenn.edu/pdq_html/cites/08/08226.html (updated August 1999)
4. Bannister LH et al. Salivary Glands. In: Bannister LH et al, editors. *Gray's Anatomy*. 38th ed. New York: Churchill Livingstone, 1995: 1691-9
5. Dry Mouth. National Oral Health Information, 1999. Available from <http://www.healthtouch.com/level1/leaffles/nohic/nohic002.htm>
6. Drugs implicated with xerostomia. Available from <http://www.seattledentist.com/xerostomia.htm> (updated June 1999)
7. Oral complications of cancer and cancer therapy. National Cancer Institute. Available from <http://www.meb.uni-bonn.de/cancernet/302904.html> (updated October 1999)
8. Sedano HO. Frequent Oral Diseases in HIV Positive and AIDS Patients: Salivary Gland Enlargement. UCLA Periodontics Information Center, 1998. Available from <http://www.dent.ucla.edu/pic/courses/oralaids/ulcers/salivary.html>
9. Prescription Information for Salagen Tablets (pilocarpine hydrochloride), MGI Pharma, 1998. Available from <http://www.mgipharma.com/mgi/product/salagen.htm>

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