Use of an Organic Iodine Compound to Decrease Oral Microflora in the Implant Patient

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It has been the desire for dentists to be able to perform surgery in the mouth under sterile conditions. The accomplishment of such a procedure could prevent autogenous infections as well as contribute to the surgery. Povidone iodine has been suggested as a mouthrinse to reduce the numbers of microorganisms[1]. This article is a report of a procedure designed to offer an oral environment in which the oral microbial flora is significantly reduced.

The patient is prepared for surgery by an explanation of what the dentist will be doing. Sterile towels containing a sterile cup, a pair of hemostats and 2 by 2 gauzes are opened. An organic iodine disinfectant* is poured into the cup. Sterile gloves are donned. The gauze in the hemostat is saturated with povidone-iodine. In a circular pattern, the disinfectant is applied to the face, starting around the lip area. When finished, the covered area extends upward over the zygoma to within one-half inch of the bridge of the nose, in nares of the nose outward to the ears and downward to below the chin to the laryngeal prominence. Inside the oral cavity, upper and lower teeth, cheeks, tongue (surface and below), floor of mouth and palate are wiped off using fresh gauze dipped in the disinfectant. A sterile toothbrush is used to brush buccal, occlusal, lingual surfaces of teeth, hard palate tissue and superior surface of tongue. (Sterile gauze is used to secure patient's tongue while sterilizing the oral cavity). A sterile facial drape (towel) is placed with the opening over the patient's face. The full length drape to be used on the patient is opened cautiously so not to contaminate it, and the patient is draped.

The final procedures prior to surgery are to cover the x-ray cone, handpiece, and suction hoses with a sterile drape, and to put on new sterile gloves and gown. When docter and assistants are capped, masked and gowned, the surgery begins. All operations were performed by a single surgeon.

The dentist who performed implant surgery checked his records and found that when he was not using a disinfectant prior to 1980 (from 1976-1980), he observed that 14 out of 103 patients had infections. After 1980, the surgeon began to use povidone-iodine as described. Only 16 out of 319 patients developed infections, a reduction of more than 50 percent and is significant by chi-square analysis, corrected for continuity, ($p = 0.007$). Infections were determined within 14 days postsurgical and most displayed a purulant exudate. Before 1980, most of the postsurgical problems were around the incision line. After 1980, most of the infections were around the teflon healing collar and the incision line was healthy. Infected patients received 500mg V-cillin K or Erythromycin four times a day for seven days.

Ten patients were used in this study. All were caucasion, 25-45 years of age, with seven being female. Surgery was of the post or blade type of implant, which took 60-90 minutes.

Sterile cotton swabs, moistened in test tubes containing 1 ml. of 0.05 percent yeast extract water were used to sample for oral microflora. All samples were taken from the crest of the ridge that was going to be cut, and after suturing, from the crest where it had been sutured. The swabs were returned to their original tubes and the same day the material was plated on trypticase soy agar containing five percent sheep's blood. The entire area was sampled before surgery and four times during surgery. Sampling was not begun until 10 minutes after completion of the application of povidone-iodine. Thereafter, samples were taken every eight to 15 minutes, depending on progress of surgery. This allowed time for the antiseptic to kill bacteria as well as be diluted by salivary secretion. The plates were incubated aerobically at 37C for 48 hours. Evaluations for microbial growth were made according to the footnote in the table. The technician performing the plating and reporting the results did not know the sequence of samplings.

Oral Cavity Disinfection with Betadine
Median CFU's/swab

Treatment group	n	Median CFU's	Range
Pre-betadine (Positive control)	10	5.0	3–5
Ten minutes after betadine	10	0.5*	0–4
Pre-operation	9	2.0*	1–5
Post-operation	10	2.5*	0–4
After suture	10	3.0	2–5

*significantly different from positive control ($p<0.05$)
5 = lawn; 4 = too numerous to count, but not a lawn;
3 = 101–1000 CFU's; 2 = 11–100 CFU's; 1 = 1–10 CFU's; 0 = 0 CFU's.
(CFU's = colony forming units).

Results

Data from the ten patients are given in the table. Data were analyzed for significance by the multiple Wilcoxon matched-pairs signed ranks test adjusted so that the overall Alpha did not exceed 0.05.

The data show that intense aseptic treatment of the oral cavity with an organic iodine compound prior to surgery caused significant reductions in oral bacteria during the course of surgery. The data showed that reductions from the control occurred at every sampling with statistical significance being obtained at each time interval except the last (after suture).

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Discussion

The significant reductions in microflora indicate that povidone-iodine has a marked effect on the oral microflora. With time, the microflora return to their original populations. This is likely due to loss of effect of povidone-iodine and/or the transmission of microorganisms from other oral areas to the area being sampled.

This study represents a first step in learning more about the role of disinfectants in preventing disease in the oral cavity during surgical procedures. Data presented in this study indicate a significant reduction in infections and in aerobic microflora.

Plaque alone contributes 10^{10} viable microorganisms to the oral population[2]. Future studies in this area should include a prophylaxis a day before surgery in order to reduce the initial bacterial load.

Future studies should be more refined. We would use a better quantitative technique involving dilution of the samples, and looking for anaerobes as well as aerobes and specific pathogens such as *Bacteroides* species, *Streptococcus* pyogenes and *Staphylococcus aureus*. Compounds other than organic iodine should be evaluated.□

*Povidone-Iodine Prep Solution, Medline Accucare, Mundeline, ILL.

References

1. Crawford, J.J. Clinical Asepsis in Dentistry, et. 2, Dallas, 1978, R.A. Kolstad, Publisher, pp. 16-17.
2. Marsh, P. and Martin, M. Oral Microbiology, 2nd ed., American Society for Microbiology, 1984.