Sinus Trephination of the Supra-orbital Sinuses
In Psittacine Birds: An Aid in the Treatment
Of Chronic Sinus Infections

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Summary
Historically, chronic sinus infections have been difficult to treat in psittacine species. While the newer, more efficacious antibiotics (1) have eliminated much of the problem, the tendency toward caseation of pus makes antibiotic penetration of infection difficult. This problem is particularly evident in the hollow sinus areas.

A simple surgical technique, used by the senior author for over 15 years, enables antibiotic solutions to reach the more inaccessible sinus compartments. This last-resort technique is worth considering in problem cases.

Anatomy
Sinus anatomical characteristics, while similar, differ considerably among the various psittacine species. The sinus system of the budgerigar, for instance, appears much simpler in construction with fewer chambers and a predominantly anterior infraorbital sinus network (2).

The larger parrots, which are more prone to chronic sinus infection, fit the description, given by Walsh, as follows:

"The two major portions of the upper respiratory system, the rhinal cavities and the infraorbital sinuses, are well known but not always well understood in their interrelationship. Air first passes through the cere past the operculum, then the chonchae, which act as sites for heat exchange, heat conservation, olfaction, filtration, and water conservation. The right and left nasal cavities are separated by a nasal septum; these communicate at the choanae with the oral cavity and the glottis of the trachea.

The lateral walls of the rhinal cavity separate them from the infraorbital sinuses (the paranasal sinuses). While these sinuses may differ with each species, general characteristics will be discussed. The infraorbital sinuses lie lateral to the rhinal cavities and practically surround the eye in many species.

There are many diverticula from the main sinus body which may be named separately, with portions extending into the bones of the skull. The lateral walls of the infraorbital sinuses are formed by the facial musculature. These sinuses often communicate with each other through a central nasal sinus situated in the caudal portion of the beak passing under the cere. There are small communications with the rhinal cavity medially from the sinuses, as well as communications with the oral cavity through the infundibular cleft (3).
Treatment of Sinus Conditions

The majority of acute upper respiratory and early sinus conditions respond readily to up to date antibiotic therapy and rhinal flushing. Gram stains, culture and sensitivity data, cytology of sinus washings, radiology and transillumination will aid greatly in the diagnosis and evaluation of upper respiratory problems. The authors feel that 97% of the upper respiratory infection can be cured with relatively routine therapy, especially if vigorously treated in the acute stage.

In chronic cases of client neglect, client non-compliance to proper treatment regimens, poor treatment technique by veterinarians, or highly resistant organism proliferation, serious sinus involvement may occur. Cases of this kind often present with long histories of recurrent swellings, bone involvement (particularly African Creys), recurrent pet shop treatment regimens, etc. In chronic cases, an attempt should always be made to properly diagnose the condition and localize any swellings before drastic surgery is contemplated. Sometimes using appropriate antibiotics alone as well as performing nasal flushes will cure a chronic case without drastic surgical techniques. Injecting the paranasal sinuses with antibiotic saline mixtures is commonly performed. The paranasal sinuses can be entered by injecting through the skin (lateral wall) at a site midway and slightly ventral to a point equidistant between the naris and the eye. Antibiotics injected into this area will perfuse the paranasal sinus area around the eye and can reach an area that a nasal flush may not be able to reach in a chronic case of sinusitis.

Surgical Techniques

Most surgical treatments for sinusitis involve lancing the periorbital area or the infraorbital sinuses along with the use of systemic antibiotics. In most cases, this is all that is necessary. The limitations are that the infusion of fluid solutions into the anterior chambers of the supra-orbital sinuses which seems efficacious in budgerigars cannot uniformly reach dorsal and posterior chambers of the supra-orbital sinuses in the larger psittacines.

Sinus trephination is rarely used but may be necessary if infection of posterior nasal sinuses or paranasal sinuses has become extensive. In cases of chronic sinusitis, pus pockets or micro-abscesses may form. These areas are often not accessible to conventional antibiotic therapy due to the lack of blood perfusion. If repeated sinus flushing (nasal technique), sinus injecting, and antibiotic therapy dictated by repeat Gram stains and cultures and sensitivities fails, and other possibilities have been ruled out (i.e., allergies, foreign body particle inhalation, viruses, etc.), then sinus trephination is considered.

Supra-orbital Sinus Trephination

The purpose of sinus trephination is to create an opening to instill flushing and antibiotic solutions to an otherwise inaccessible area (usually 1:10 to 1:100 solutions by volume of Gentamycin, Amikacin, Tobramycin, Ticarcillin, Carbenicillin, Piperacillin, Claforan, etc.). Antifungal solutions have been used by the authors in this way, also.

The patient is anesthetized by appropriate gaseous anesthetic to facilitate a quick recovery. Originally this was accomplished using metofane by cone but is now performed under isoflurane (Forane - Ohio Chemical). Endotracheal tubes can be installed but the author prefers to quickly perform the procedure through a mask-down technique using the mask to maintain anesthesia. Do not use injectable anesthetics due to the potential bleeding that may be encountered and possible danger of blood inhalation.
The surgical sites (see figures) vary according to species. The hole sites are made into the frontal bones about 2/5 to midway between the most anterior plane of the eye and the nares and inward toward an imaginary line dividing the skull sagitally. The site is first plucked and cleaned with betadine prep and then alcohol. Care must be taken to not injure the eyes during the preparation and gentocin ophthalmic is recommended preoperatively.

An initial incision over both sites can be made with the Ellman Surgitron (10, 11) or by conventional instrumentation. Skin bleeding is the biggest problem if an electrocautery unit is not available. Silver nitrate or ferric subsulfate can be used to stop bleeding. The bone is exposed and a Dremel tool with a small rotary drill bit is used to create the openings. The frontal bones are drilled carefully until cancellous bone above the supra-orbital sinuses is visualized. Then the opening is carefully inspected and the drilling continued. Gel foam can be used to control bleeding if necessary. Once the openings are made, they can be widened to visualize the supra-orbital sinuses. Swabs are made for Gram stains and cultures and sensitivities with Calgi-swabs. Patency of the new openings is tested by injecting a flushing mixture into the openings. Fluid should be evident from the choanal slit and the eye on the side of the opening tested should bulge. Be careful about over expanding the periorbital area as ocular damage could theoretically result. Absorption of the periorbital fluid is rapid. Recovery is accomplished in a darkened cage. If post-operative bleeding occurs, ferric subsulfate can be carefully applied and gel foam packing used. Profuse amounts of ferric subsulfate should not be allowed to drain into the supra-orbital sinuses.

The following day, the trephination sites can be used to flush the sinuses. They can be flushed 2-3 times daily and ophthalmic solutions instilled. Of course, systemic antibiotics are used, as well. The openings will seal rapidly and may require forced opening to retain patency. Once they seal, healing is rapid. Usually very little scar tissue is noticeable after healing has occurred, especially if the area is normally covered with feathers.

**Conclusion**

The trephination procedure should be used as a last resort method to treat a chronic sinus infection. Other methods of treatment should first be attempted such as antibiotic therapy, rhinal washings, lancing the supra-orbital sinus, etc. If all else fails, consider the trephination approach as a way of exposing the infected areas to a continual flow of antibiotic washing solution. Considerable anatomical study should be made prior to attempting the procedure, as ocular damage could result with an improperly placed incision. All in all, the procedure has produced good results when indications for its use were warranted.
REFERENCES


FIGURE 1
Sites for Supra-orbital Trephination
FIGURE 2

Comparison of Flushing Techniques Versus Trephination

1: Extent of rhinal flushing perfusion
2: Extent of maxillary sinus injection perfusion
3: Extent of supra-orbital injection perfusion
4: Extent of sinus trephination perfusion