Sialolithiasis in Donkeys (8-Feb-2005)

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Introduction
Sialolith formation is considered to be an uncommon problem in the horse [1] and yet is, in our experience, a reasonably common presenting problem in donkeys living in arid environments. Over the last three years we have seen 20 equidae presenting to SPANA (Society for the Protection of Animals Abroad) clinics in Morocco with sialoliths. Of these over 75% were donkeys.

In relation to the species breakdown of our patient population as a whole the donkeys are considerably over represented, and the horses slightly underrepresented. Species breakdown for 12,500 outpatients in 2003 was as follows:

- Donkeys - 24%
- Horses - 30%
- Mules - 46%

The large numbers of donkeys that we see with sialoliths seems to indicate that the donkey is predisposed to sialolith formation in comparison to other equine species or hybrids. Whether this reflects an anatomical difference in duct structure, a difference in saliva composition or quantity or simply a difference in diet is a question that merits further research.

Equidae have paired parotid, mandibular and polystomatic sublingual salivary glands. In contrast to other species sialolithiasis in equidae has only been reported in the parotid duct, usually at its most rostral portion, just before it opens into the vestibule opposite the third upper cheek tooth (Triadan 108 or 208). In humans, sialoliths are found most often in the submandibular and parotid glands and less commonly in their associated ducts; why sialolithiasis is restricted to the parotid duct in equidae is unknown.

Diagnosis of sialoliths is made on clinical presentation and palpation. Sialoliths are hard, smooth, mobile and painless enlargements that are readily recognized on palpation at the level of the upper arcade adjacent to the third or fourth cheek tooth (Fig. 1). Possible differential diagnosis to rule out could be tooth abscesses or buccal tumors.

Figure 1. Clinical appearance of donkey presented with a sialolith. - To view this image in full size go to the IVIS website at www.ivis.org . -

Etiopathogenesis
Sialolithiasis causes blockage of the salivary duct, salivary gland dysfunction and oral mucosal ulceration, which in turn causes a degree of discomfort, dysphagia and possible gland atrophy. Horses secrete copious amounts of saliva in comparison to other herbivores with a 500 kg horse producing an average of 12 L daily with even higher volumes produced when fed dry or grain feed [2]. These large volumes of saliva have an important lubricating role, preventing esophageal obstruction and
providing a buffering function with its high bicarbonate content (approx. 50 mEq/l) [3]. Blockage of the salivary duct may put equidae at risk for digestive disorders.

The exact cause of the formation of sialoliths is unknown. It is thought that some organic matter lodges in the duct and forms a nidus around which calcium salts (mostly carbonates) are then deposited. This results in a stone that can grow in size up to over 10 cm in length composed largely of calcium carbonate laid down in visible concentric layers (Fig. 2).

Figure 2. Sialolith removed from a donkey. - To view this image in full size go to the IVIS website at www.ivis.org. -

The organic nidus is considered to be either vegetable matter that gained entry from the mouth or cellular debris from localized inflammation with the participation of bacteria. However, it is difficult to explain fully the genesis of sialoliths from such minor secretory disturbances, especially since bilateral sialolithiasis exists; this would have to presuppose coincidental bilateral nidus formation of similar chronicity. The possible presence of a sphincter system in the human parotid duct has been mooted as a possible cause of sialolithiasis in humans, however, serial histological examination has so far revealed no evidence [4]. More convincingly, research in human medicine has shown significant differences in composition of saliva between affected and control groups particularly in regard to salivary calcium, which was higher in the affected group, and salivary phytate concentration which was lower in the affected group. These researchers concluded that a deficit of crystallization inhibitors such as myo-inositol hexaphosphate (phytate) could be a significant etiologic factor in the genesis of sialoliths [5].

High levels of salivary calcium could also be the result of renal pathology or other causes of hypercalcemia; malignancy, primary hyperparathyroidism (extremely rare in equidae), hypervitaminosis D and granulomatous diseases such as tuberculosis. Horses have slightly higher levels of blood calcium concentration than other domestic species, with levels of up to 13 mg/dl being normal. Whether this is the case with donkeys is unknown. Serum calcium concentrations of <15 mg/dl could conceivably increase salivary calcium levels to a point where sialolith formation was favoured without other clinical signs being obvious. Serum calcium levels of >18 mg/dl are associated with severe clinical signs such as polyuria/polydipsia. None of the equidae presenting to SPANA clinics with sialolithiasis showed any other clinical abnormalities apart from the presence of the sialolith. Further work to measure salivary composition in affected and control groups in equine sialolithiasis would be beneficial, especially to investigate possible inter species differences between horses and donkeys.

There seems to be no gender predisposition to the formation of sialoliths. Animals appear to be vulnerable to sialolith formation over a wide range of ages, and despite reports that sialolithiasis is a disease of older animals [6] many of the animals we see with sialoliths are less than 8 years old.

The increasing vulnerability to sialolith formation as the aridity of the environment increases is striking, with incidence correlating well with latitude. SPANA’s northernmost clinic is in Tangiers where a high incidence of rainfall ensures a supply of green food for equidae throughout the year. No cases of sialolithiasis were reported from Tangiers over the last three years. In contrast, SPANA’s most southerly clinic, on the edge of the Sahara, reported 9 cases over a similar time scale. Feeding regimens for equidae in this area vary by season but the mainstay is a straw based diet supplemented with bran, molasses and barley. Donkeys, being at the bottom of the equine hierarchy in terms of utility to the owner, are fed almost exclusively on straw in this area. It seems logical to conclude that diet has some bearing on sialolith formation, although the existence of bilateral sialoliths makes it unlikely to be the sole etiology.

Treatment

Treatment of sialolithiasis in equidae has traditionally been restricted to surgical removal via a trans-cutaneous approach [7] but this method can cause complications if the duct closure fails and fistula formation results. In our experience this is quite a common sequela to a transcutaneous surgical approach. In addition, the dorsal buccal branch of the facial nerve runs just dorsal to the surgical site and inadvertent nerve damage is a risk with this surgery. In human sialolithiasis, sialoendoscopy with a trans-oral approach is accepted as the treatment of choice for most sialoliths followed in some instances by marsupialization of the incised ductal margins to the mucosal margins [8]. A transoral approach to removing sialoliths is recommended in equidae [6] and has, in our experience, been free of complications. The procedure is simple and involves a linear incision of the mucosa of two to three cm over the site of the sialolith (Fig. 3). Prior injection of several ml of lidocaine
and use of a Hausmann's gag facilitates this procedure. The incision is allowed to heal by secondary intention. We have found no requirement to sedate the animal. The high incidence of fistulization and infection if the transcutaneous approach to removal is employed further backs up recent recommendations that removal should be via a trans-oral route.

Many of the sialoliths treated by SPANA had only been noticed by the owner over a period of months. This is testament to their relatively rapid evolution. It is noteworthy that none of the cases we have seen have recorded a chronicity of more than one year. This is somewhat surprising as very few conditions are presented to the veterinarian in Morocco within a reasonable time frame. Even serious trauma or disease is often left to an advanced stage before the owner seeks help. This raises the question of what happens if sialoliths are simply treated with benign neglect, do they spontaneously erode through the buccal mucosa and exit alone? The majority of cases present with mucosal ulceration over the site of the sialolith. Some sialoliths have shown molar marks on the stone once excised and one case actually presented at the point of spontaneous exit. It seems possible therefore that the explanation for the absence of cases of sialoliths dating from more than 12 months is that they have a tendency to spontaneously resolve once they reach a certain size. Removing them through the oral mucosa may simply be hastening what in many instances may have been their natural outcome.

References


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